sorted into discards and rejects, following the work of Callahan (1979), to study tool utilization patterns. Whenever possible, low-power magnification was utilized to study edge damage of tools to determine tool functions. Projectile points and ceramics were classified by standard culture historical types.

Flotation samples were processed using a water-powered flotation device with initial screening through window screen mesh for heavy fractions and silk bags for light fractions. All samples were then dried and run through nested sets of sieves. All samples were then sorted by hand and any seeds, charcoal, debitage, or other artifacts and ecofacts, were removed for further study and identification. Initial processing of the first sets of flotation samples revealed poor preservation of ecofacts and a low recovery rate for artifact classes such as debitage. Therefore, only a sample of the flotation samples were processed. The sample was chosen to provide coverage of the varied sub-areas of the site.

RESULTS AND INTERPRETATIONS

This section of the report will first detail the findings of the excavations at the Hawthorn site and then describe the interpretations of the findings. Presentation of the results will be organized into four categories: stratigraphy, excavated artifacts, features, and flotated artifacts and ecofacts. Interpretation of results will be organized into three topics: chronology, technologies, and activity areas.

Stratigraphy

In general, the stratigraphies recorded during Phase III data recovery confirmed those recorded during the test excavations (Figure 3, Appendix VI). Figure 7 shows the locations of the four major composite profiles to be discussed. Figure 8 shows Profile I, the major east-west composite profile for the site, and shows the slope of the soil horizons from the uphill (western) end of the site to the downhill (eastern) end. Table 3 describes the soil horizons noted in the profiles. Horizon I is composed of very recent slope wash and extends only across the squares along the toe of the slope. Horizon II is composed of a mix of recent plow-disturbed soils and sediments derived from numerous episodes of slopewash that occurred prior to the episodes that deposited Horizon I. Historic artifacts from the 19th and 20th century are found in Horizon I and II indicating a very recent age for their deposition. Horizon III represents a buried plow zone that includes both historic and prehistoric artifacts in a disturbed context. Horizon IV is a buried B horizon that has been intact for up to 5000 years (see Wagner letter in Appendix I). The in situ artifacts were found in this horizon. The origin of this soil seems to include both slope wash and possible aeolian deposition. The texture of Horizon IV is a sandy loam with a relatively high proportion of silt sized particles and although it is not a typical loess, the soils in Horizon IV are similar to aeolian soils identified at other sites in the Middle Atlantic and Southeast (Curry and Custer 1982; Stewart 1983a, 1981; Wagner et al 1982; Carbone et al 1982).

FIGURE 7

PROFILE LOCATIONS

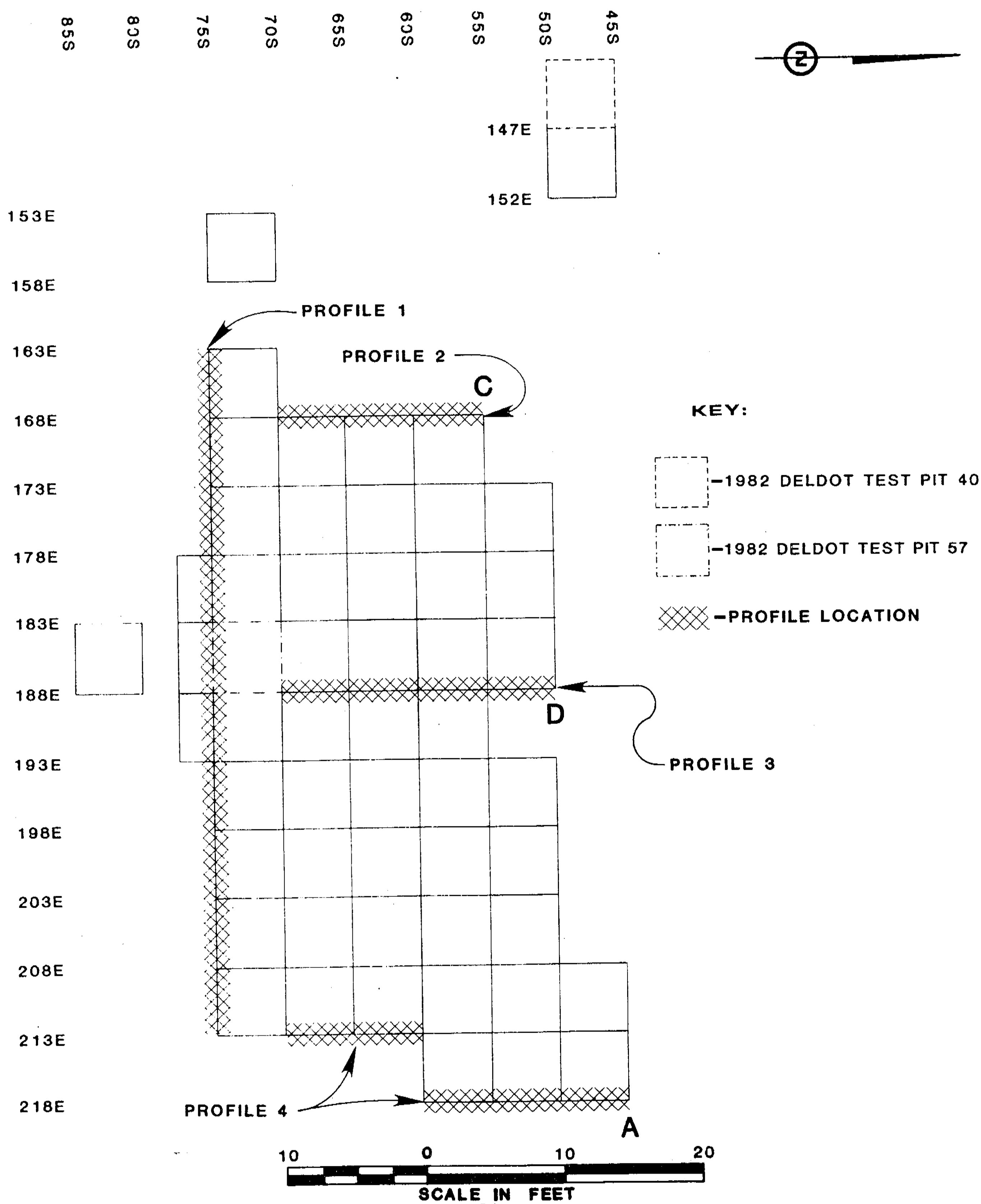
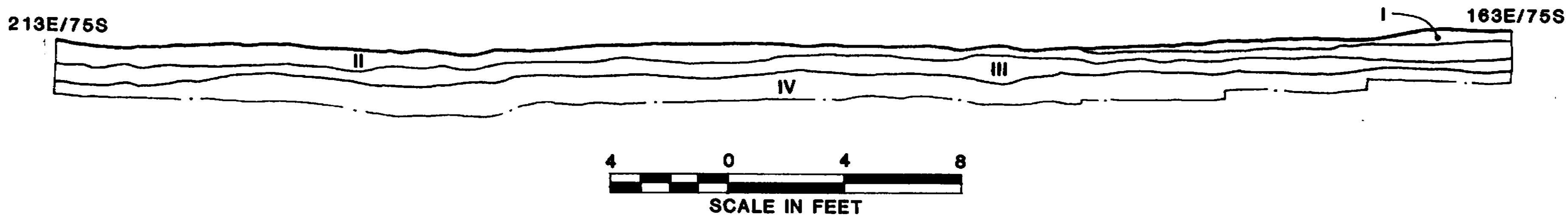


FIGURE 8

PROFILE I



KEY:

HORIZON I — MODERN FILL LEVEL. ORGANIC ROOTS, DARK BROWN (10YR 3/3) LOAM WITH METAL AND GLASS FRAGMENTS.

HORIZON II — SLOPE WASH. BROWN (10YR 4/3) SANDY LOAM WITH COBBLES, HISTORIC ARTIFACTS, AND LITTLE SIGN OF DEVELOPMENT.

HORIZON III — BURIED PLOW ZONE. DARK BROWN (10YR 4/4) LOAMY SAND WITH SOME DEVELOPMENT OF STRUCTURE.

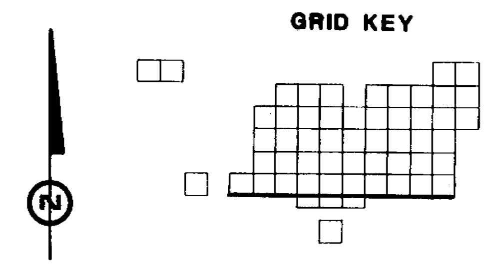


Table 3

Soil Horizon Descriptions*

Horizon I -	Modern fill level. Organic roots, dark-brown (10YR 3/3) loam with metal and glass fragments).
Horizon II -	Slope wash. Brown (10YR 4/3) sandy loam with cobbles, historic artifacts, and little sign of development.
Horizon III -	Buried plow zone. Dark brown (10YR 4/4) loamy sand with some development of structure.
Horizon IV -	Buried B horizon. Reddish brown (7.5 YR 4/4) argillic sandy loam horizon with manganese mottles and thin clay films. Probably ca. 5000 years old.
Horizon V -	Cobble lense. Dense accumulation of poorly sorted cobbles and coarse reddish brown (10YR-7.5YR 4/4) sands.
Horizon VI -	Laminated sands. Alternating reddish-yellow and green coarse sands with numerous well-developed red lamellae. Probably Columbia (Pleistocene) formation.
Horizon VII -	Macadam driveway.
Horizon VIII -	Driveway fill. Coarse yellow-tan sandy fill.

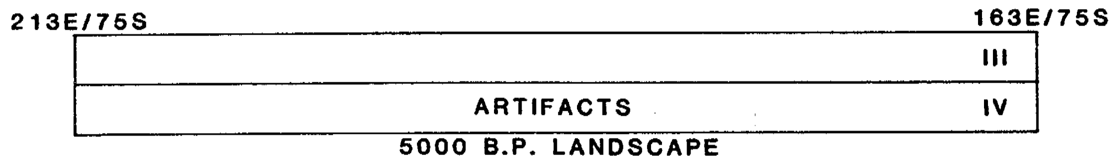
*Soil horizon descriptions derived from Wagner's field descriptions and mechanical analysis included in Appendix I.

It is interesting to note that the slope of the ground surface represented by the buried plow zone and B horizon is flatter than the modern ground surface. The people who lived at the site in the prehistoric past lived on a relatively flat surface. Sometime after the deposition of the artifacts the soils comprising the top of the B horizon and the plow zone were deposited, probably as part of the stabilization of slopes in the local area. Later, historic period slope wash and fill (Horizon II) were deposited at a steeper slope burying the plow zone and B horizon. A final, very recent, episode of slope wash deposited Horizon I. Figure 9 and Plate 3, Appendix V show the various episodes of deposition that buried prehistoric artifacts at the Hawthorn site.

Figures 10, 11 & 12 show three north-south profiles of the site and their locations are noted in Figure 7. Figure 10 shows the north-south profile at the western end of the site. Horizons I - IV correspond to horizons in Figure 9 (Profile I) and Table 3, and represent the same depositional events. Horizons V and VI were exposed in a deep excavation unit and are composed of cobble lenses and laminated sands, respectively. These two horizons resulted from ancient Pleistocene alluvial deposition and correspond to Pleistocene soils more than 20,000 years old seen in other profiles from the region (e.g. - Custer 1982a: 4, Fig. 3). The different textures noted between Horizons IV and VI (see Table 3 and Appendix I) underscore the possible aeolian origin of Horizon IV. The discontinuity between Horizons IV and VI that can be dated to ca. 5000 BP based on pedological analysis (see Wagner letter, Appendix I) and artifacts (see later discussion of

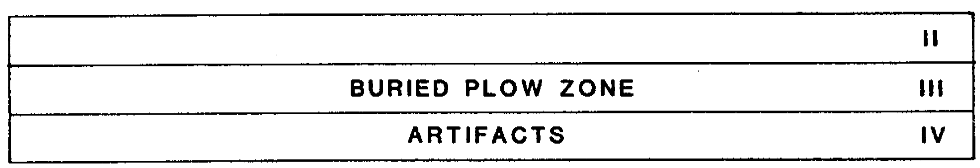
FIGURE 9

EPISODES OF SOIL DEPOSITION

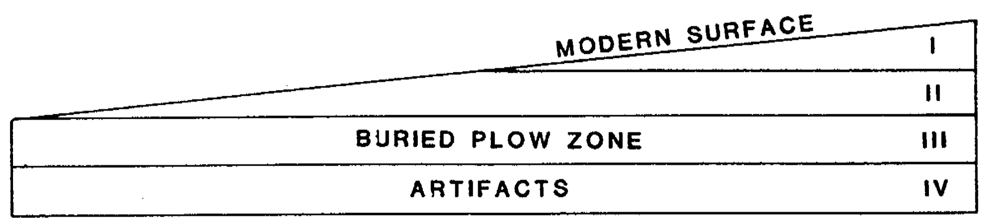


EPISODE 1–DEPOSITION OF HORIZONS III AND IV
(Post 5000 B.P.–Pre 200B.P.)

EPISODE 2–PLOWING AND DISTURBANCE OF HORIZON III
(Post 250 B.P.)



EPISODE 3–HISTORIC DEPOSITION OF SLOPE WASH (Post 200 B.P.)



EPISODE 4–DEPOSITION OF MODERN SLOPE WASH

KEY:

HORIZON I – MODERN FILL LEVEL. ORGANIC ROOTS, DARK BROWN (10YR 3/3) LOAM WITH METAL AND GLASS FRAGMENTS.

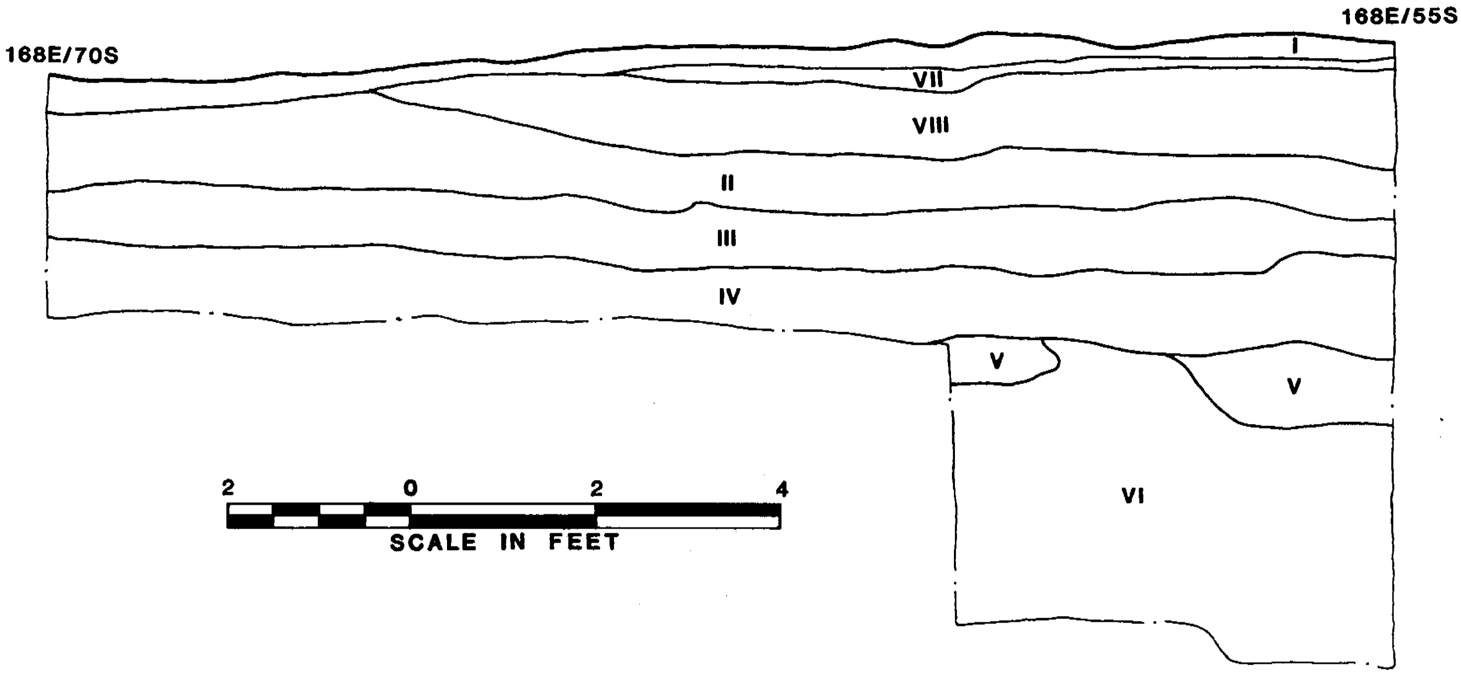
HORIZON II – SLOPE WASH. BROWN (10YR 4/3) SANDY LOAM WITH COBBLES, HISTORIC ARTIFACTS, AND LITTLE SIGN OF DEVELOPMENT.

HORIZON III – BURIED PLOW ZONE. DARK BROWN (10YR 4/4) LOAMY SAND WITH SOME DEVELOPMENT OF STRUCTURE.

HORIZON IV – BURIED B HORIZON. REDDISH BROWN (7.5YR 4/4) ARGILLIC SANDY LOAM HORIZON WITH MANGANESE MOTTLES AND THIN CLAY FILMS. PROBABLY CA. 5000 YEARS OLD.

FIGURE 10

PROFILE II



KEY:

HORIZON I — MODERN FILL LEVEL. ORGANIC ROOTS, DARK BROWN (10YR 3/3) LOAM WITH METAL AND GLASS FRAGMENTS.

HORIZON II — SLOPE WASH. BROWN (10YR 4/3) SANDY LOAM WITH COBBLES, HISTORIC ARTIFACTS, AND LITTLE SIGN OF DEVELOPMENT.

HORIZON III — BURIED PLOW ZONE. DARK BROWN (10YR 4/4) LOAMY SAND WITH SOME DEVELOPMENT OF STRUCTURE.

HORIZON IV — BURIED B HORIZON. REDDISH BROWN (7.5YR 4/4) ARGILLIC SANDY LOAM HORIZON WITH MANGANESE MOTTLES AND THIN CLAY FILMS. PROBABLY CA. 5000 YEARS OLD.

HORIZON V — COBBLE LENSE. DENSE ACCUMULATION OF POORLY SORTED COBBLES AND COARSE REDDISH BROWN (10YR-7.5YR 4/4) SANDS.

HORIZON VI — LAMINATED SANDS. ALTERNATING REDDISH YELLOW AND GREEN COARSE SANDS WITH NUMEROUS WELL DEVELOPED RED LAMELLAE. PROBABLY COLUMBIA (PLEISTOCENE) FORMATION.

HORIZON VII — MACADAM DRIVEWAY.

HORIZON VIII — DRIVEWAY FILL. COARSE YELLOW TAN SANDY FILL.

GRID KEY

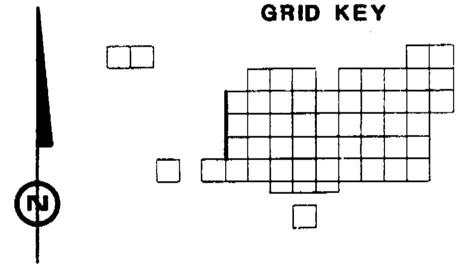
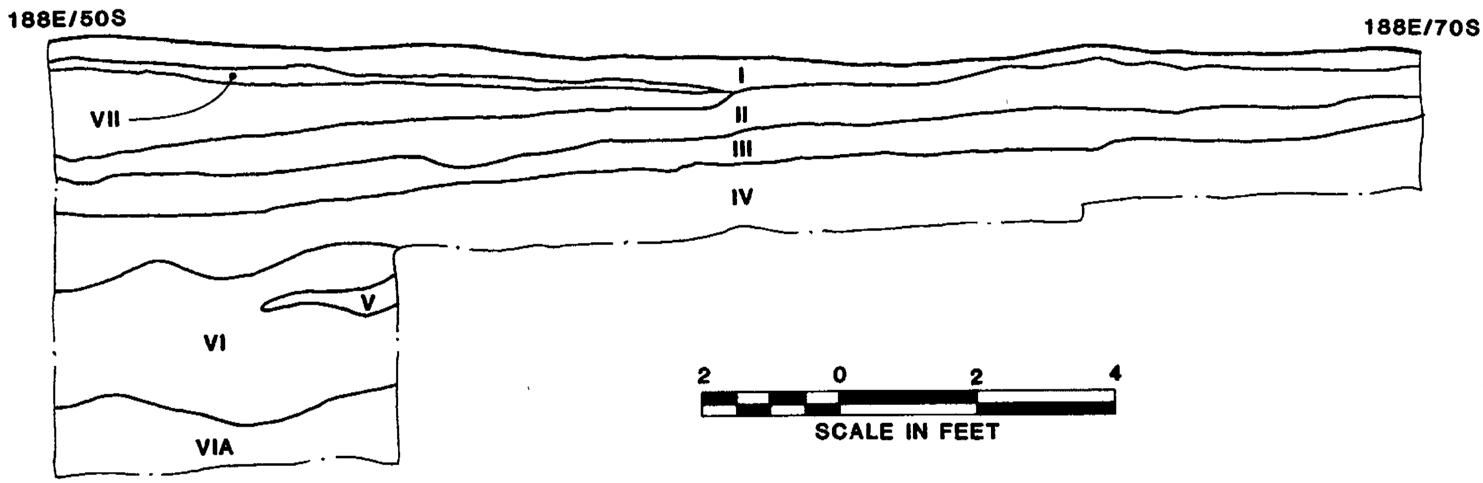


FIGURE 11

PROFILE III



KEY:

HORIZON I — MODERN FILL LEVEL. ORGANIC ROOTS, DARK BROWN (10YR 3/3) LOAM WITH METAL AND GLASS FRAGMENTS.

HORIZON II — SLOPE WASH. BROWN (10YR 4/3) SANDY LOAM WITH COBBLES, HISTORIC ARTIFACTS, AND LITTLE SIGN OF DEVELOPMENT.

HORIZON III — BURIED PLOW ZONE. DARK BROWN (10YR 4/4) LOAMY SAND WITH SOME DEVELOPMENT OF STRUCTURE.

HORIZON IV — BURIED B HORIZON. REDDISH BROWN (7.5YR 4/4) ARGILLIC SANDY LOAM HORIZON WITH MANGANESE MOTTLES AND THIN CLAY FILMS. PROBABLY CA. 5000 YEARS OLD.

HORIZON V — COBBLE LENSE. DENSE ACCUMULATION OF POORLY SORTED COBBLES AND COARSE REDDISH BROWN (10YR-7.5YR 4/4) SANDS.

HORIZON VI — LAMINATED SANDS. ALTERNATING REDDISH YELLOW AND GREEN COARSE SANDS WITH NUMEROUS WELL DEVELOPED RED LAMELLAE. PROBABLY COLUMBIA (PLEISTOCENE) FORMATION.

HORIZON VII — MACADAM DRIVEWAY.

HORIZON VIII — DRIVEWAY FILL. COARSE YELLOW TAN SANDY FILL.

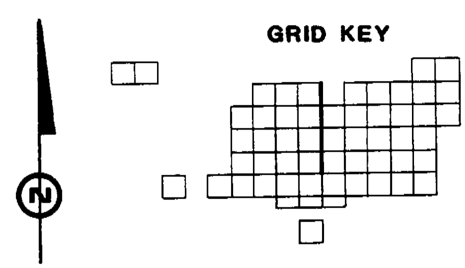
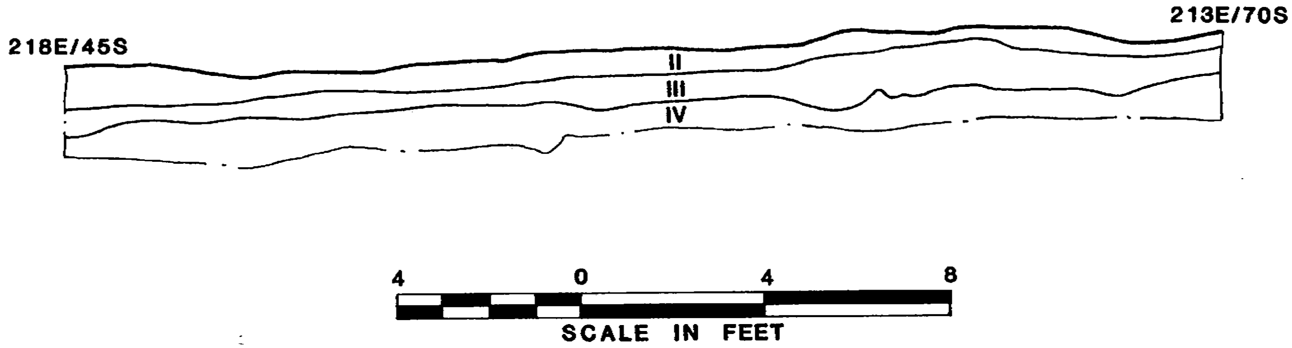


FIGURE 12

PROFILE IV

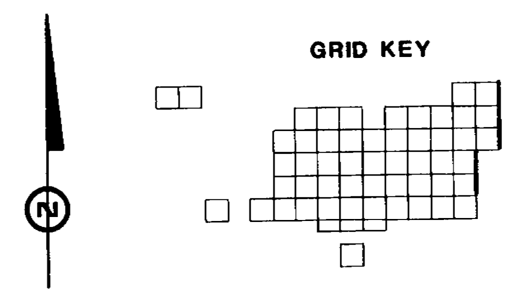


KEY:

HORIZON II — SLOPE WASH. BROWN (10YR 4/3) SANDY LOAM WITH COBBLES, HISTORIC ARTIFACTS, AND LITTLE SIGN OF DEVELOPMENT.

HORIZON III — BURIED PLOW ZONE. DARK BROWN (10YR 4/4) LOAMY SAND WITH SOME DEVELOPMENT OF STRUCTURE.

HORIZON IV — BURIED B HORIZON. REDDISH BROWN (7.5YR 4/4) ARGILLIC SANDY LOAM HORIZON WITH MANGANESE MOTTLES AND THIN CLAY FILMS. PROBABLY CA. 5000 YEARS OLD.



site chronology) also has paleoclimatic significance. Similar depositional discontinuities in the Middle Atlantic can be dated to the same time period and are thought to be related to the mid-postglacial xerothermic, a period of high temperatures and low moisture (Curry and Custer 1982; Custer n.d.). It should also be noted that well-developed lamellae were observed in Horizon VI. These lamellae and their degree of development indicate that overlying landscapes (i.e. Horizon IV, which contains the artifacts) were stable for up to 5000 years (Carbone et al 1982; Wagner et al 1982; Stewart 1983). Horizons VII and VIII are unique to Profiles II - IV and are the result of modern landscape alteration. Horizon VII is a layer of macadam and is part of an access road built through the area in historic times. Horizon VIII is a layer of coarse sand fill that was deposited as a base foundation for the road. It should be noted that the bottom of Horizon II represents the natural surface and slopes down to the north toward an ephemeral stream channel. The bottom of Horizon IV slopes even more steeply and represents the landscape upon which prehistoric groups lived.

Profile III, depicted in Figure 11, shows a similar series of landscape slopes and an identical series of soil horizons. The landscape slopes in this area of the site are even steeper than those seen in Profile II. Figure 12 shows Profile IV from the eastern-most limit of the site. Horizons noted match with other profiles from the site and the slope to the north is much lower than in the other north-south cross-sections of the site.

In all profiles, Horizon IV, which contained all of the in situ artifacts, can be seen to be rather deeply buried and relatively free of post-depositional disturbances. Also, the ancient landscape represented by Horizon IV is much flatter than the modern landscape in the east-west direction. However, the old landscape upon which artifacts were deposited did dip fairly steeply toward the now inactive stream channel on the northern edge of the site. Nonetheless, the sloping portion of the old landscape is outside the main concentration of artifacts (north of the 55S line and west of the 188E line). Figure 13 shows a block diagram of the site which depicts the relationships of the buried landscapes. In sum, analysis of site stratigraphy shows that the majority of the artifacts were recovered from an undisturbed soil horizon approximately 5000 years old.

Excavated Artifacts

The general catalogue of all artifacts recovered from the excavations is on file at the Island Field Museum and is organized by individual 1' squares within the 5' excavation units. Appendix II provides a special catalogue of all tools, including projectile points and bifaces, and ceramics. Analysis of distribution maps of various artifact classes and raw materials will be discussed in the intepretation of activity areas.

Features

Three features were exposed during the DelDOT test excavations and the Phase III data recovery program. Each feature and its context is described below. Figure 14 shows their locations. It should be noted that the features described

FIGURE 13

BLOCK DIAGRAM

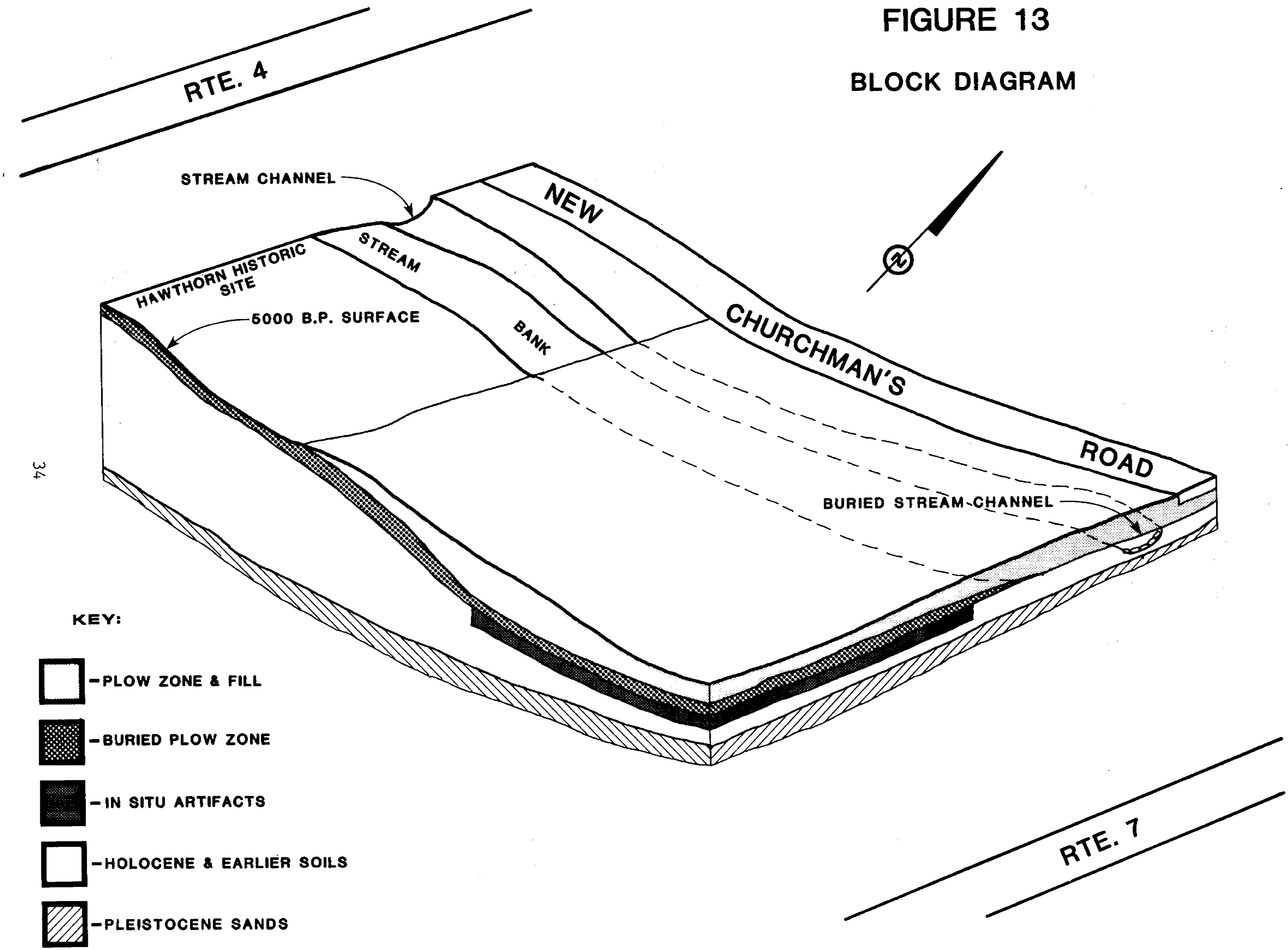
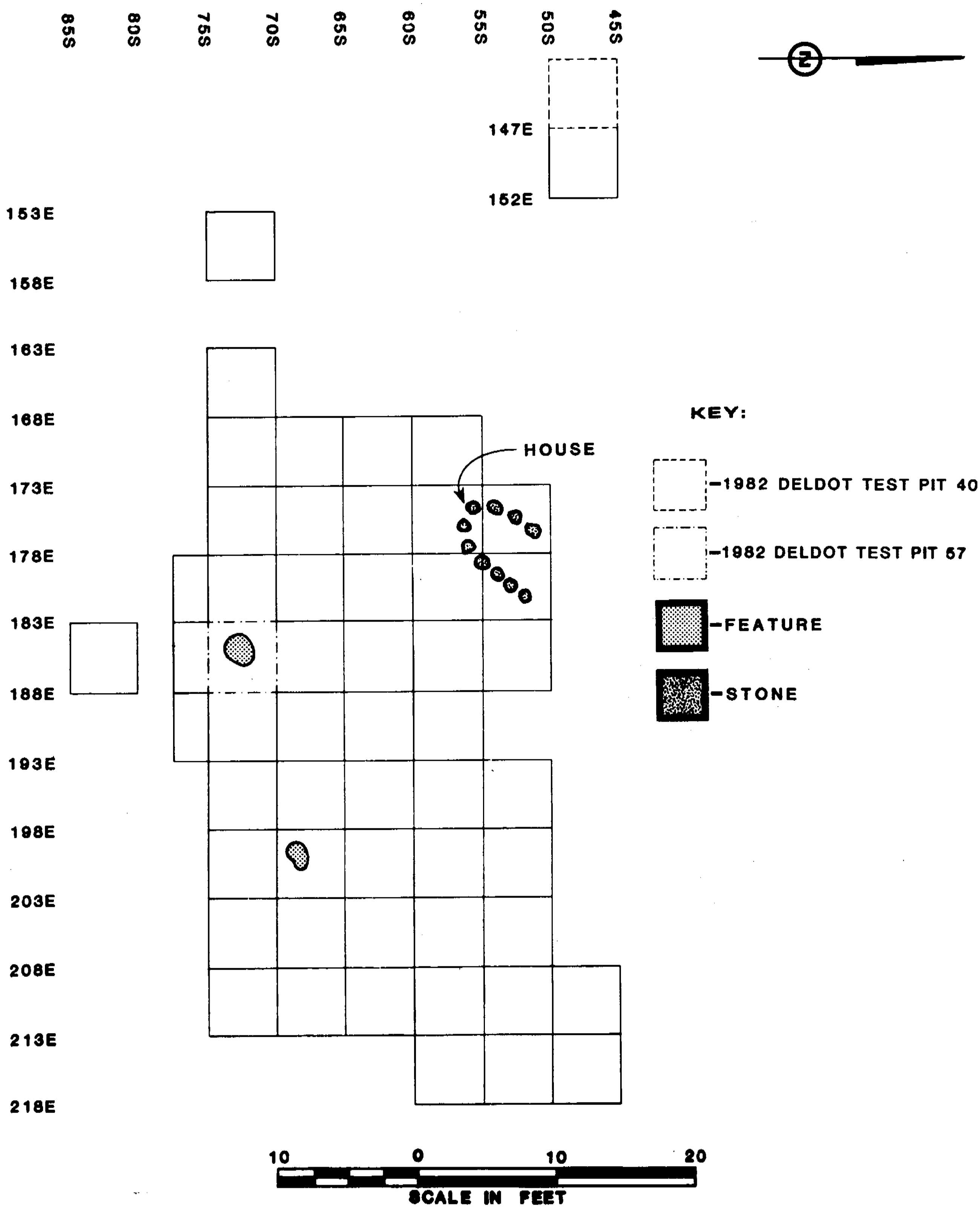


FIGURE 14

FEATURE LOCATIONS



below were all defined on the basis of soil stains or cobble concentrations. Chipping features, such as those described by Gross (1974), were not identified because the majority of the artifacts encountered during the excavations were not piece-plotted using exact provenience. However, concentrations of debitage are noted in the analysis of the activity areas.

The first feature to be discussed is Feature 1 in DelDOT Test Square 57 (183E75S). This feature was defined on the basis of a reddish-brown soil discoloration and contained numerous artifacts, including flakes of quartz, quartzite, and chert, and a biface fragment (see Appendix I listing for 183E75S and Bachman and Custer 1983). Some charcoal was also present within the feature. Figure 15 shows a plan view of the feature and its profile. There are no indications of the irregularities of feature shape that characterize a rodent burrow or root stain. Based on the presence of charcoal and artifacts within the stain, it is suggested here that the feature represents a small hearth or fire pit.

The second feature to be discussed is Feature 1 in square 198E70S (Figure 14). This feature was defined as a black organic soil discoloration with charcoal including many charred hickory nut hulls. Flakes were also present in the feature. The texture of the soil was much coarser than the surrounding matrix. Figure 16 shows a plan view and profile of the feature. The shape of the feature is somewhat irregular and suggests that perhaps there was some rodent burrow disturbance of this cultural feature.

FIGURE 15

FEATURE NO. 1

(See Photo of National Register Form)

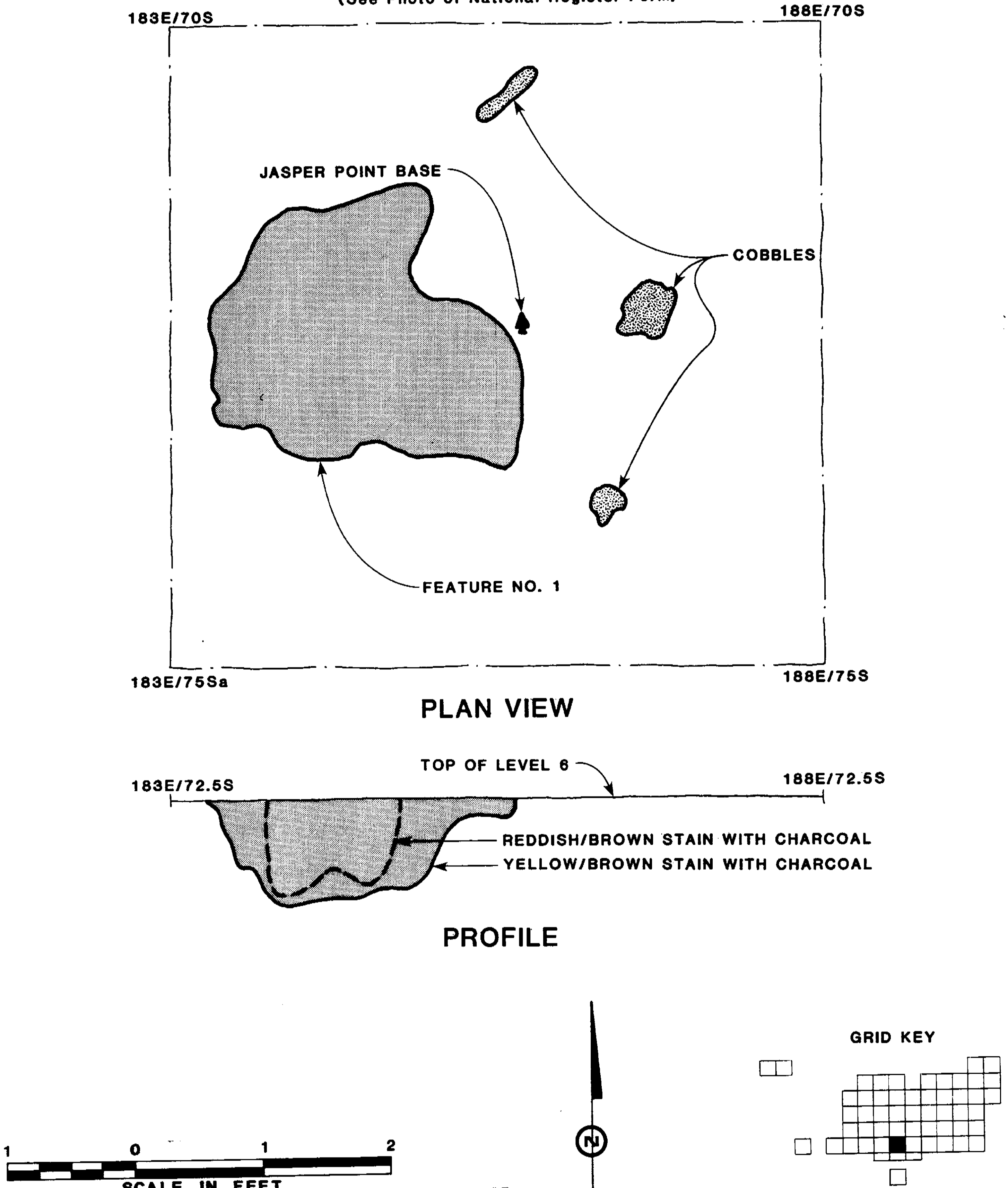
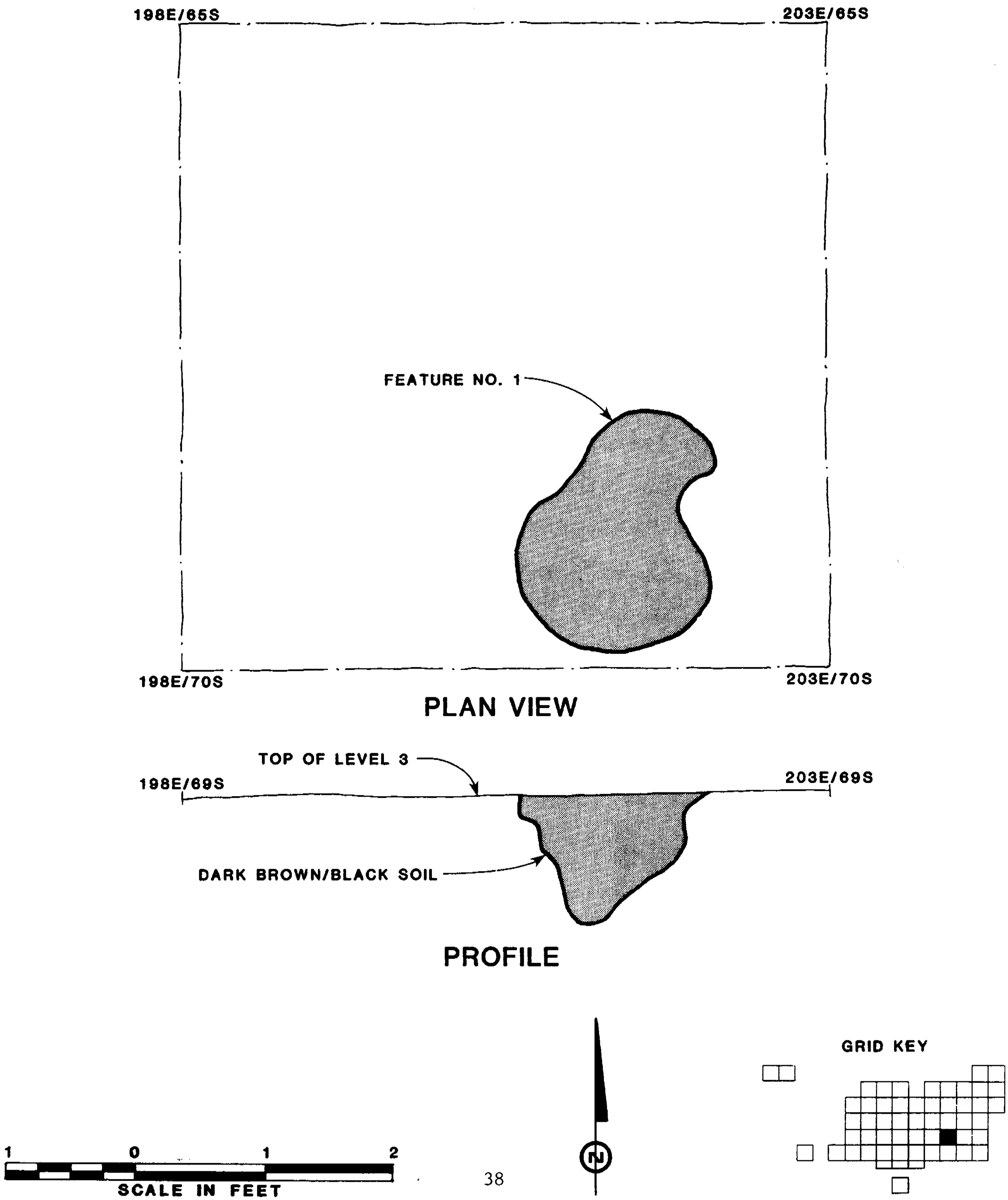


FIGURE 16

FEATURE NO. 1



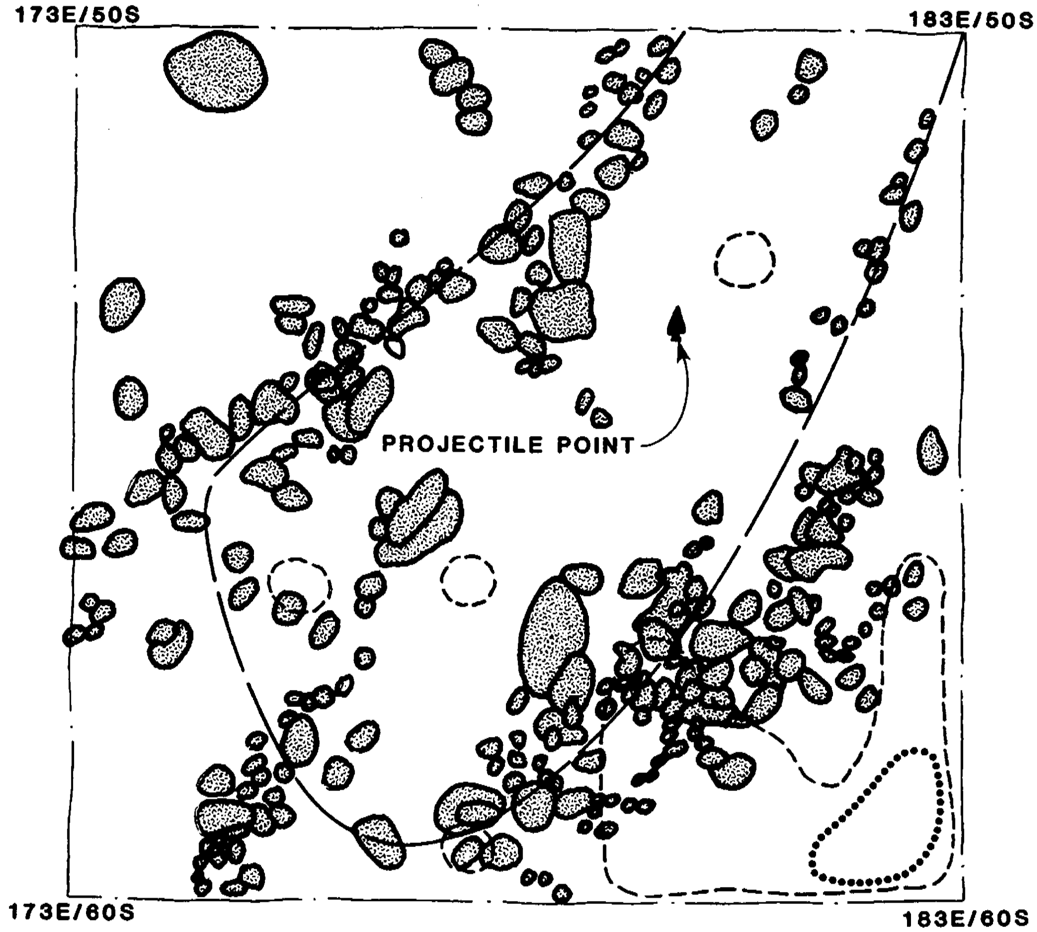
Most likely the original cultural feature was a hearth or roasting pit related to the processing of hickory nuts.

The final feature to be discussed is a series of cobble concentrations found in square 173E50S, 173E55S, 178E50S, and 178E55S (Figure 14). Figure 17 shows a map of the cobble feature and associated artifacts. Plate 2 shows a plan view photograph of the feature and Plate 3 shows an oblique view photograph. Noted in Figure 17 is a possible parallel arrangement of the cobbles with a perpendicular connection to the southwest. The arrangement of cobbles suggests a possible tent ring structure with the cobbles placed around the perimeter of the structure. Similar cobble arrangements have been noted at the Fifty Site, a Paleo-Indian processing site in Viginia (Carr 1975), at Naskapi-Montagnais and Maritime Archaic sites in Labrador (Fitzhugh 1972: Plates 21-24, Figures 48, 53), and at numerous hunting camps of various ages in the High Plains of western North America (Frison 1978). Binford (1978a, 1983:144-160) also notes similar structures at contemporary Eskimo hunter-gatherer sites.

Also noted in Figure 17 is the distribution of debitage and other artifacts in the immediate area around the possible structure. The presence of only a few scattered artifacts within the structure and a larger concentration outside the structure, in the southeast corner of 178E55S, is also similar to artifact concentration distributions seen in association with living structures at other hunter-gatherer sites including the Thunderbird site (Gardner 1974) in Virginia and Pincevent (Leroi-Gourhan and Brezillion 1966), an Upper Paleolithic site in France. Binford (1983: 144-160, 1978b) also notes similar

FIGURE 17

COBBLE CONCENTRATION, LEVELS 3 and 4



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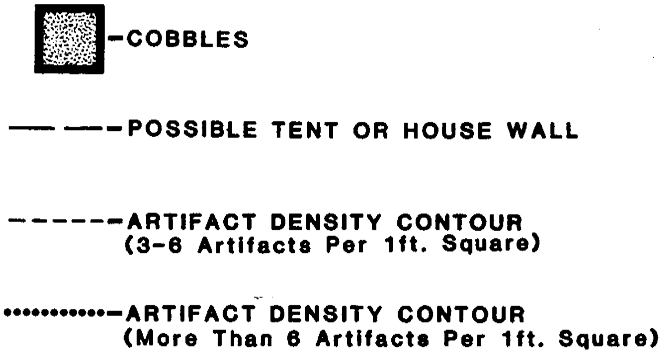


GRID KEY

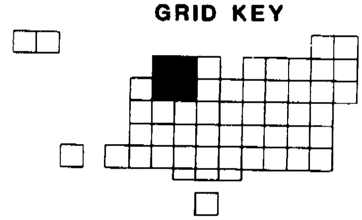


PLATE 2

PLAN VIEW-COBBLE FEATURE

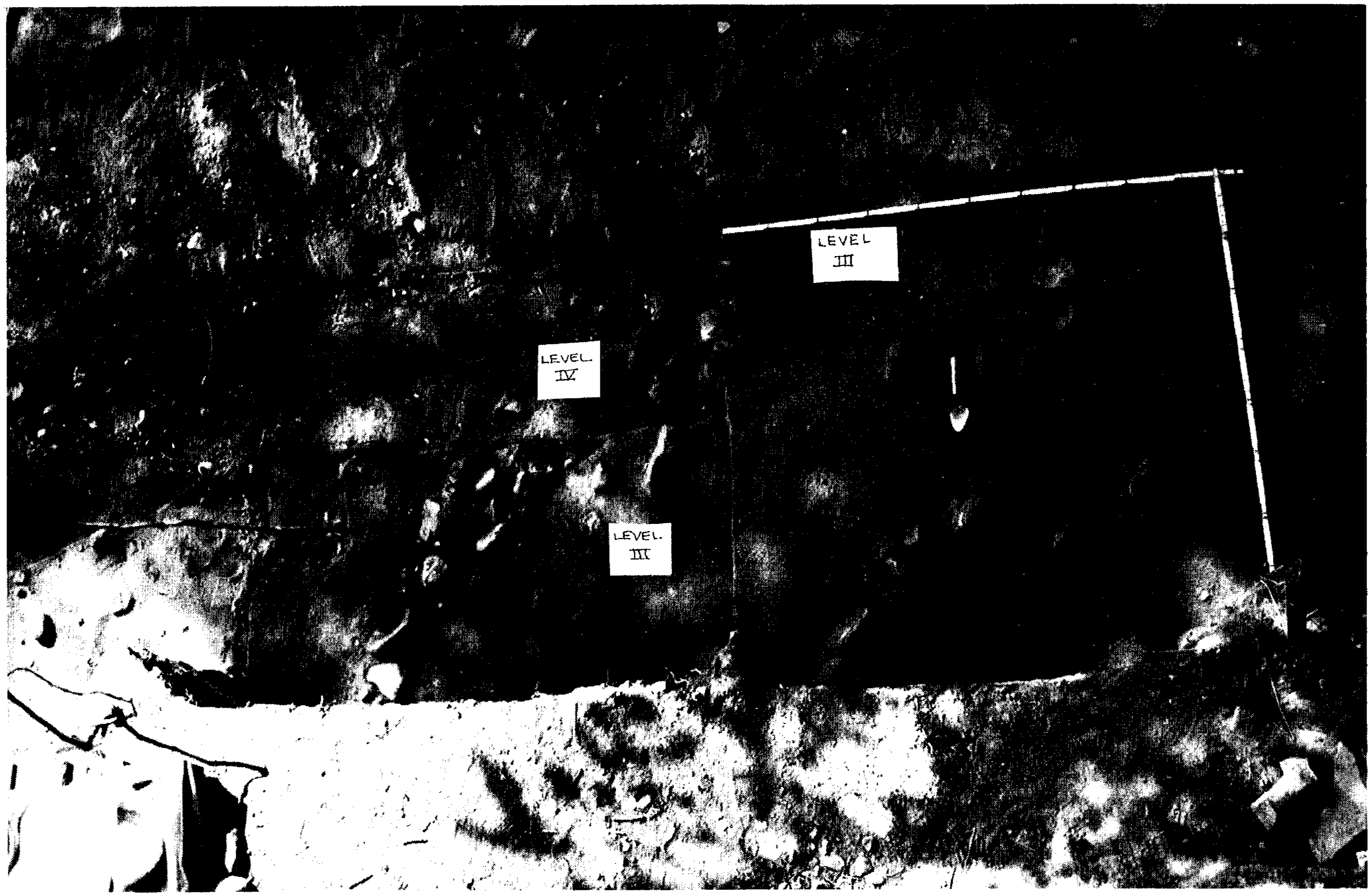
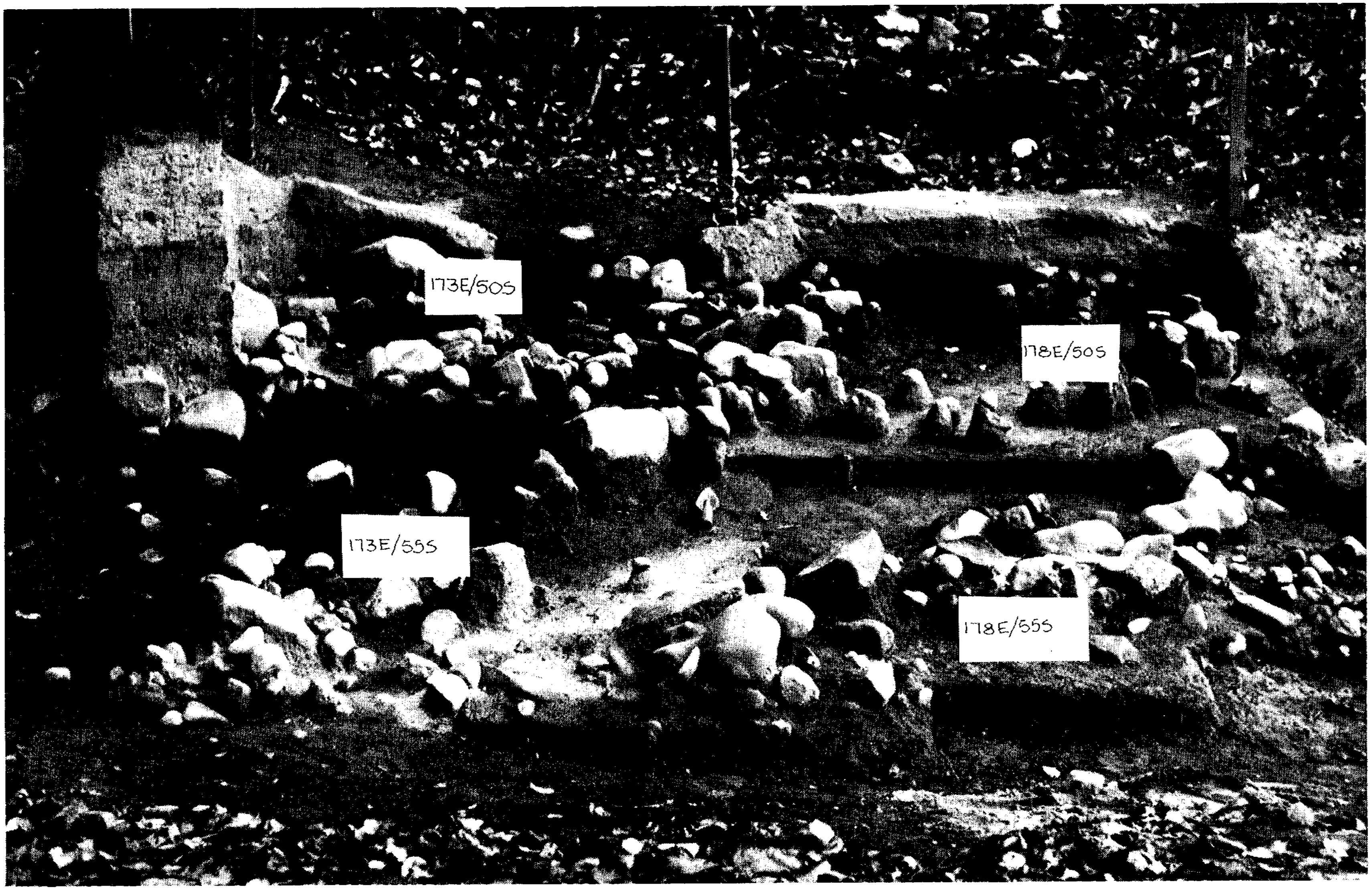


PLATE 3

OBLIQUE VIEW- COBBLE FEATURE



patterns of material culture distribution around living structures at Eskimo and other hunter-gatherer sites. Other living structures have been noted at local sites of a comparable age such as the Delaware Park site (Thomas 1981); however, factors of deposition at the Delaware Park site did not allow the analysis of associated living debris. In sum, the alignment of cobbles is similar to features identified as tent rings at other archaeological sites and is similar to ethnographic examples. Associated artifact distributions are also similar to archaeological and ethnographic living structure artifact distributions. Therefore, the cobble feature located in the northwest corner of the Hawthorn site is interpreted as a living structure, most likely the remains of a hide tent structure.

Flotated Artifacts and Ecofacts

Appendix III lists the results of the flotation analysis and provides a catalogue of all materials recovered. Small debitage was the most common material recovered from the heavy fractions of the flotation. Only a very few seeds were recovered, including some hackberry and chenopodium. These edible seeds are available primarily during the late summer. Fragments of charred hickory nuts were also often found and would have been available in the late summer and early fall. Charcoal was present along with charred bone in small quantities. No ecofacts were recovered from the light fractions of the sample. The general impression from the analysis of the flotation is that the preservation of small seeds and ecofacts is poor and the sample is biased toward the larger seeds and plant remains. The absence of preserved pollen in the sediments (see Appendix I) supports this contention. Analysis of varied distributions of artifacts and ecofacts is provided in the discussion of the interpretation of activity areas.

Chronology

Consideration of chronological interpretations of the Hawthorn site can be divided into two topics: the age of the site based on diagnostic artifacts and soils, and the duration of the occupation of the site. Each topic is described below.

Diagnostic artifacts with temporal significance include both ceramics and projectile points. Only eight ceramic sherds were recovered from the excavations. Seven of the sherds are body fragments ranging in thickness from 9mm - 12mm with coarse cord-marked impressions and large particles of quartz temper. The remaining sherd is a rim sherd with a flattened lip and interior/exterior cord marking up to the lip. These ceramics are similar to Wolfe Neck/Susquehanna ceramics described by Griffith (1982) and Smith (1978) which date to Wolfe Neck Complex times (ca. 1000 B.C. - 500 B.C.).

A variety of styles of projectile points were recovered from the excavations. Plates 4-6 show all projectile points found in the buried plow zone and Plates 7-9 show all projectile points found in the buried, undisturbed B horizon. Descriptions of all points are noted in Appendix II. Morphological types noted include stemmed, teardrop-shaped, corner-notched, side-notched, and square-based points and broadspears. Table 4 shows the vertical distribution of projectile point styles in the buried plow zone and the arbitrary 3" levels within the buried,

Plate 4

A Square-Based Point, Jasper (83/30/208, 83/30/217/26)
B Side-Notched Point, Quartz Crystal (83/30/53/1)
C Square-based, Quartz (83/30/175)
D Side-Notched Point Base, Quartz (83/30/209)
E Notched Point, Jasper (83/30/105/1)
F Susquehanna Broadspear, Jasper (83/30/32/26)
G Stemmed Point, Ironstone (83/30/112/1)
H Notched Point, Jasper (83/30/205)
I Stemmed Point Base, Quartz (83/30/75/26)
J Notched Point, Jasper (83/30/112/1)

PLATE 4

MISCELLANEOUS POINTS FROM PLOW ZONES

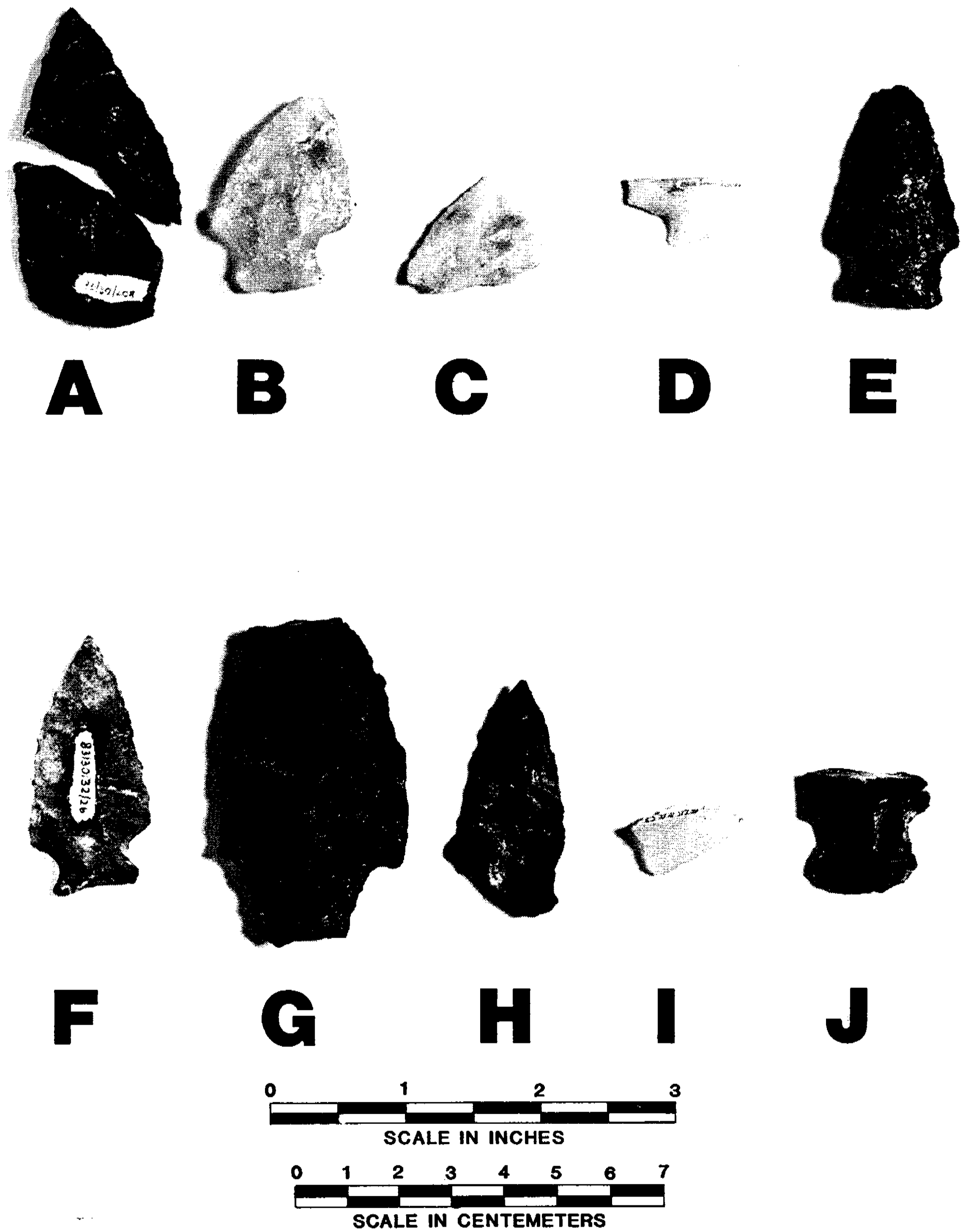


Plate 5

A	Stemmed Point, Jasper (83/30/135)
B	Stemmed Point, Ironstone (83/30/105/3)
C	Stemmed Point, Argillite (83/30/123)
D	Stemmed Point, Jasper (83/30/76/4)
E	Stemmed Point, Jasper (83/30/45)
F	Stemmed Point, Chert (83/30/123)
G	Stemmed Point, Ironstone (83/30/105/3, 83/30/1)
H	Stemmed Point, Ironstone (83/30/230)
I	Stemmed Point, Ironstone (83/30/75/3)
J	Stemmed Point, Ironstone (83/30/112/1)
K	Stemmed Point, Ironstone (83/30/73/3)
L	Stemmed Point, Ironstone (83/30/31/2)

PLATE 5
STEMMED POINTS FROM PLOW ZONE

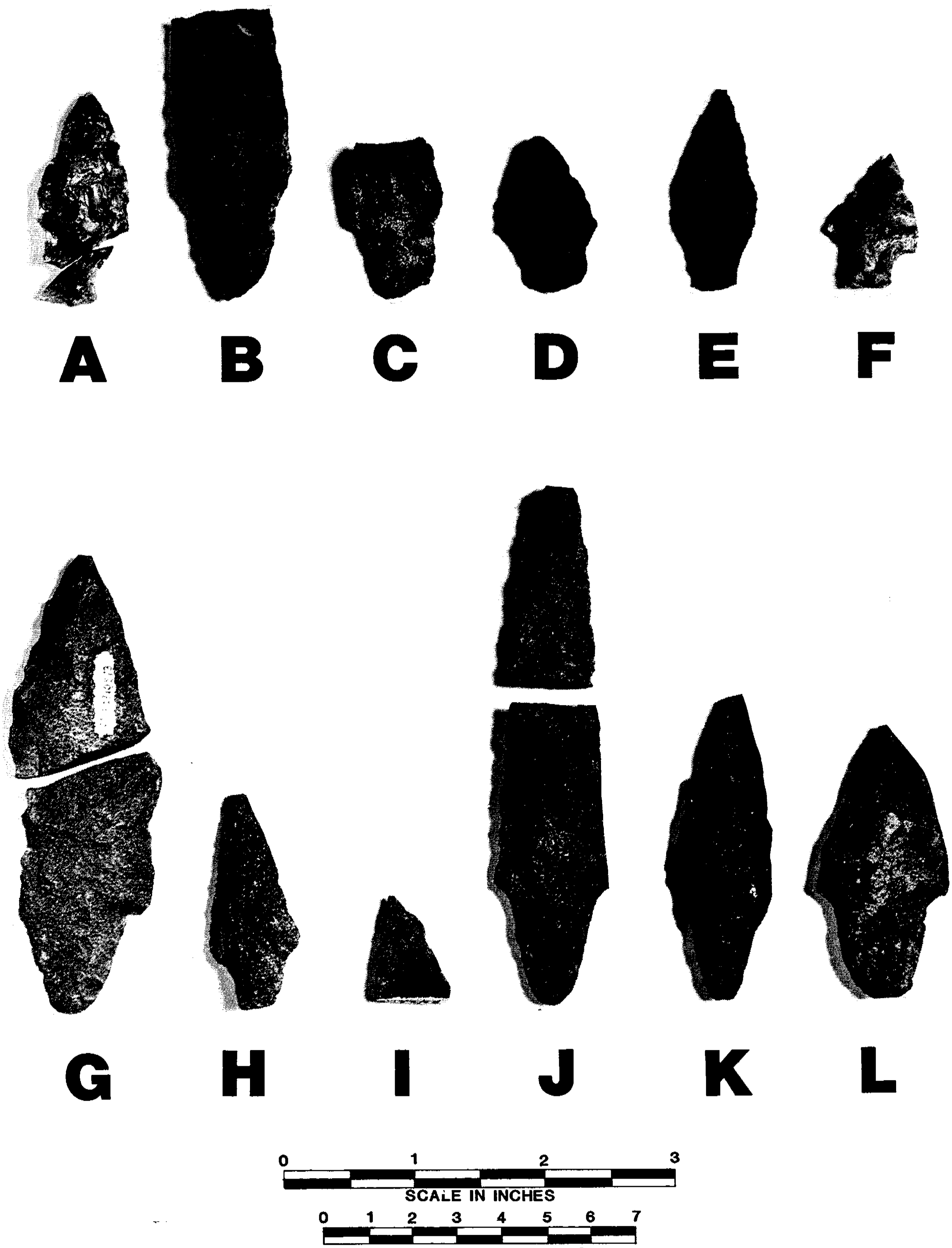


Plate 6

A Stemmed Point, Quartz (83/30/231)
B Stemmed Point, Quartz (83/30/205)
C Stemmed Point, Quartz (83/30/208)
D Stemmed Point, Quartzite (83/30/75/4)
E Stemmed Point, Quartzite (83/30/175, 83/30/178/27)
F Stemmed Point, Argilite (83/30/157)
G Stemmed Point, Argillite (83/30/124)
H Stemmed Point, Argillite (83/30/225)

PLATE 6

ADDITIONAL STEMMED POINTS FROM PLOW ZONE

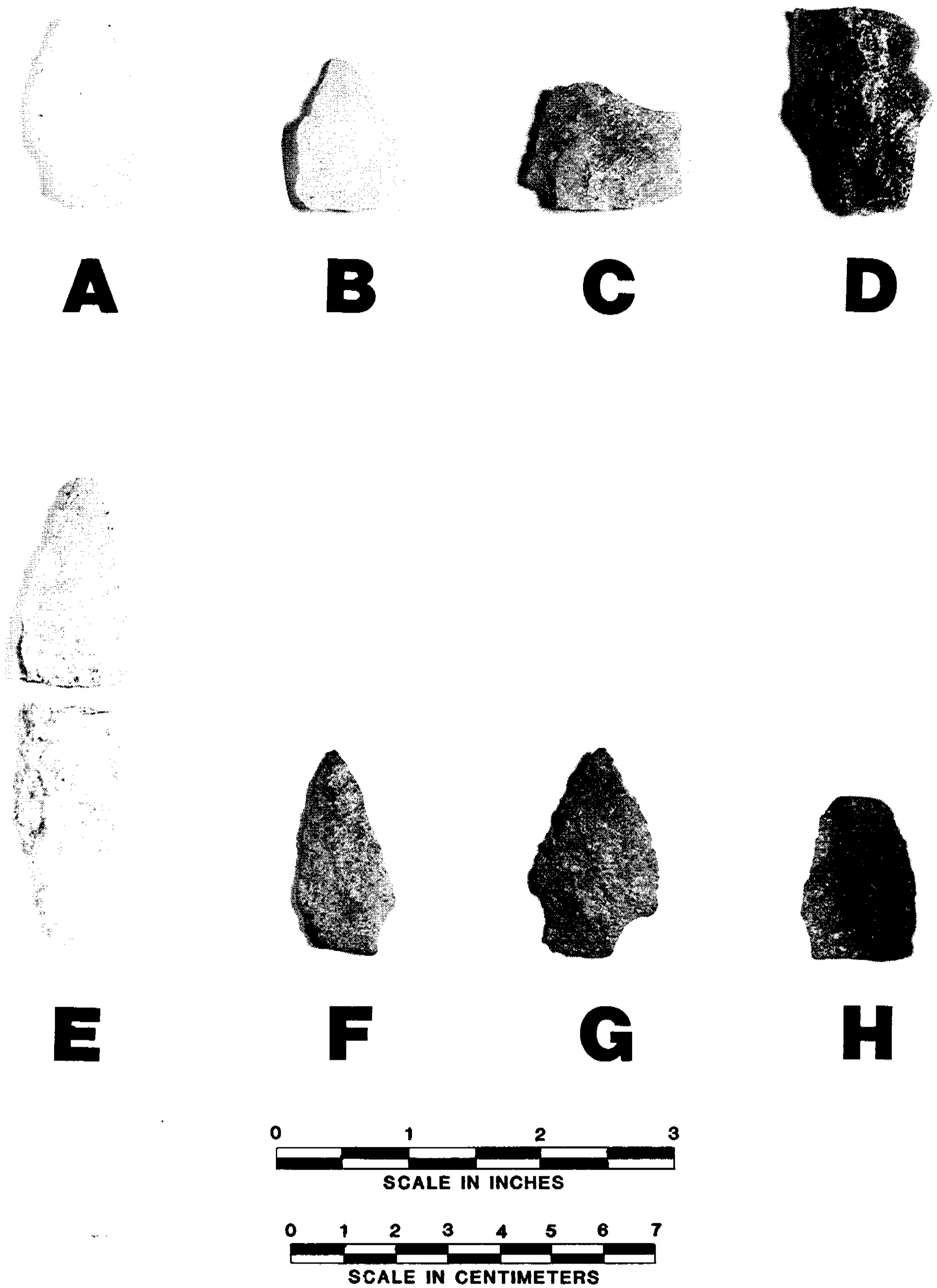


Plate 7

A Notched Point Jasper (83/30/281/3)
B Notched Point Quartz (83/30/6/20)
C Notched Point Quartz (83/30/219/20)
D Teardrop Point Quartz (83/30/30/25)
E Lehigh/Koens-Crispin Broadspear Jasper (83/30/203/27)
F Savannah River Broadspear Quartzite (83/30/280/4)
G Square Base Point Quartz (83/30242/6, 83/30/242/14)
H Square Base Point Base Quartz (83/30/15/27)
I Square Based Point Quartz (83/30/242/18)
J Square Based Point Jasper (83/30/238/7)
K Square Based Point Jasper (83/30/198/1)
L Notched Point Quartz (83/30/14/29)
M Notched Point Quartz (83/30/243/28)
N Notched Point Quartz (83/30/219/26)
O Notched Point Quartz (83/30/254/10)
P Notched Point Base Quartz (83/30/249/6)
Q Notched Point Base Quartz (83/30/243/27)

PLATE 7

MISCELLANEOUS POINTS FROM EXCAVATED LEVELS

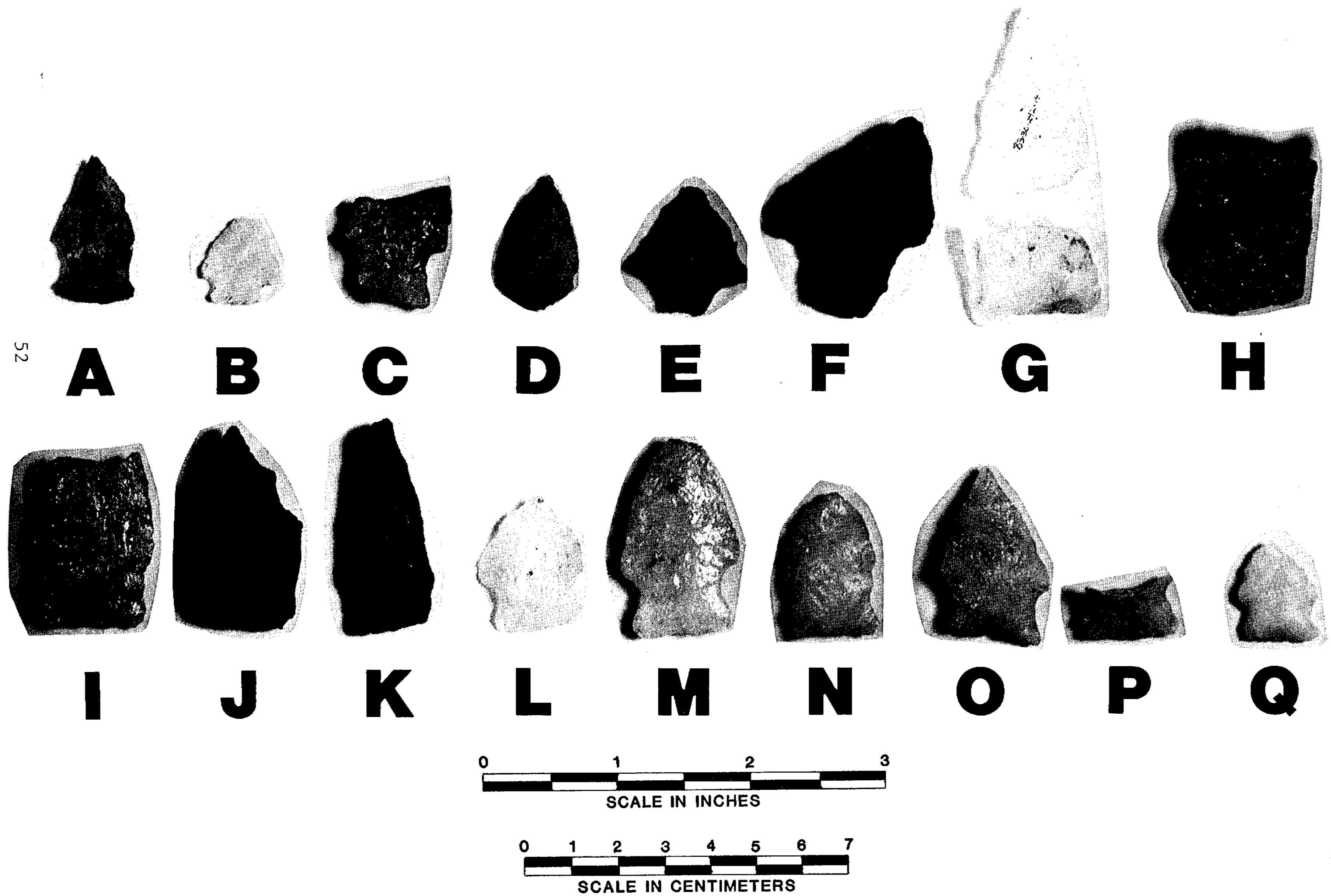
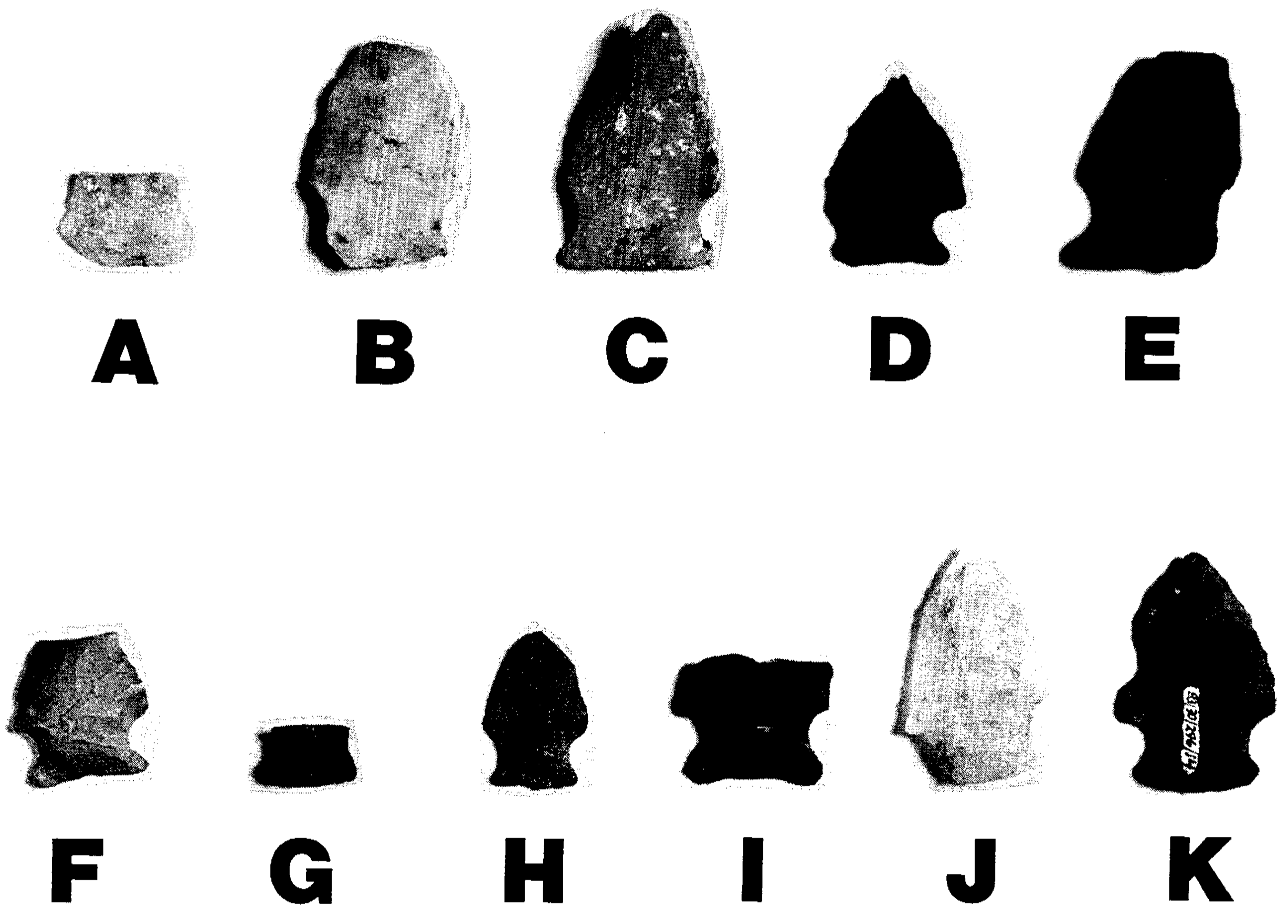


Plate 8

A Notched Point Base, Quartz (83/30/15/13)
B Notched Point Base, Quartz (83/30/213)
C Notched Point Base, Quartz (83/30/281/17)
D Notched Point Base, Chert (83/30/203/28)
E Notched Point Base, Jasper (83/30/111/26)
F Notched Point Base, Jasper (83/30/203/29)
G Notched Point Base, Jasper (83/30/78)
H Notched Point Base, Argillite (83/30/251/5)
I Notched Point Base, Argillite (83/30/243/16)
J Notched Point Base, Quartz (83/30/178/26)
K Notched Point Base, Argillite (83/30/296/14)

PLATE 8

ADDITIONAL MISCELLANEOUS POINTS FROM EXCAVATED LEVELS



0 1 2 3

SCALE IN INCHES

0 1 2 3 4 5 6 7

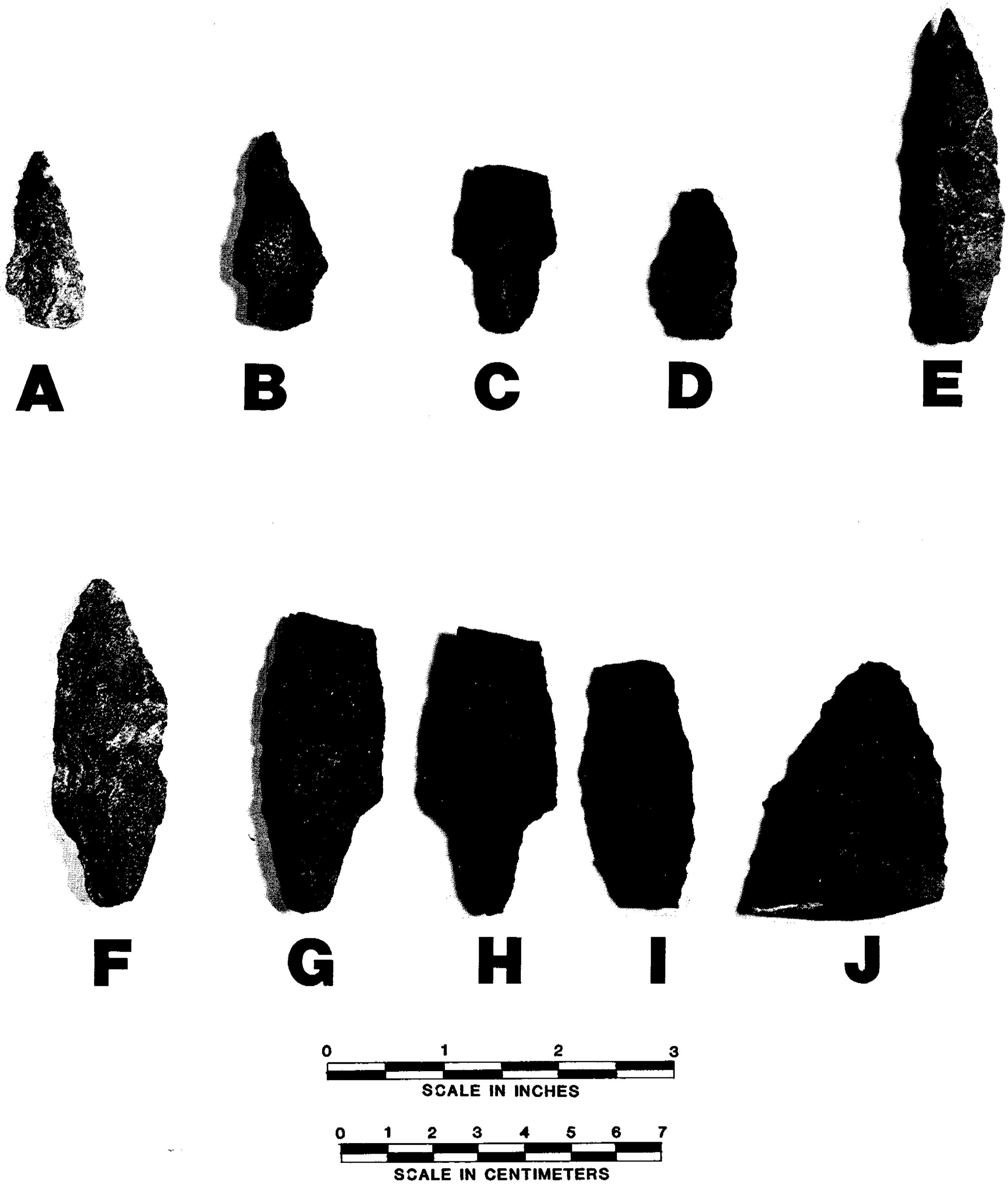
SCALE IN CENTIMETERS

Plate 9

A Stemmed Point, Jasper (83/30/281/3)
B Stemmed Point, Jasper (83/30/50/28)
C Stemmed Point, Jasper (83/30/187/26)
D Stemmed Point, Jasper (83/30/90/27)
E Stemmed Point, Japser (83/30/217/27)
F Stemmed Point, Ironstone (83/30/2/2)
G Stemmed Point, Ironstone (83/30/7/27)
H Stemmed Point, Ironstone (83/30/14/28)
I Stemmed Point, Ironstone (83/30/25/26)
J Stemmed Point, Ironstone (83/30/177/26)

PLATE 9

STEMMED POINTS FROM EXCAVATED LEVELS



undisturbed soils. At this point, some comments should be made on the morphological types noted in captions to the plates and in Table 4. Some traditional typological studies (eg. - Ritchie 1961; Kinsey 1972: Appendix I) that are commonly used in the Middle Atlantic and Northeast make distinctions among various forms of stemmed and notched points. However, although the original type descriptions are often based, directly or indirectly, on well-documented site assemblages which have temporal significance, it is not always clear that the rather subtle distinctions among certain notched and stemmed point styles can be applied across wide geographical regions. Furthermore, the senior author of this report has questioned the diagnostic nature of the stemmed point varieties noted in Kinsey's and Ritchie's typologies (Custer 1983a: Chapter 4; 1982a:33-34; Custer, Stiner and Watson 1983). Consequently, it was thought to be more useful to depict all notched and stemmed points and not note specific types.

It should also be noted that many of the earlier typologies of the Middle Atlantic region were based on a normative view of culture that linked the various projectile point types to "cultural traditions" or even individual social units. Most earlier studies also assumed that only a single style of projectile point was used at any one time by any one group. Recent ethno-archaeological studies (Weissner 1983; Hodder 1982) and archaeological studies from the region (Snethkamp, Ebright, and Serena 1982; Custer 1982a, 1982b; Moeller 1982; Stewart 1981) have called these views into question and indicate that the

Table 4

Vertical Distribution of Projectile Point Styles

Level	Side-notched	Corner-notched	Square-base	Teardrop	Stemmed	Broad-Spear	Total
PZ	3	4	1	0	20	2	30
L.2	11	0	1	0	12	2	26
L.3	5	3	4	1	2	0	15
L.4	0	0	0	0	3	0	3
L.5	1	0	0	0	0	0	1
Totals	20	7	6	1	37	4	75

cultural-historical meaning of local projectile point styles is more complicated than previously thought. In sum, when the study of projectile points and their chronological meanings were carried out for the Hawthorn site artifacts, it was considered to be more useful to document the variety of morphologies that might be present during a limited period of time in the past. Consequently, before continuing a discussion of the point styles, it is necessary to consider the duration of occupation of the Hawthorn site.

An inspection of Appendix II shows that the undisturbed artifacts beneath the buried plow zone were contained mainly within two arbitrary 3" levels. On the northern margins of the site, the cultural deposits were thicker where the old land surface sloped toward the stream channel (Figures 10-12). Nonetheless, the site is quite thin and does not show evidence of multiple living surfaces. The development of clay skins within the soil matrix of the buried argillic horizon shows that the profile has been stable and undisturbed. Root stains and rodent burrows were present and mapped; however, their overall disturbance of artifacts was minimal. Thus, the stratigraphic data indicate a single, rapidly buried, landscape with minimal post-depositional disturbance.

Although data on vertical distribution of soils and artifacts suggest a single occupation of a single landscape, it is also necessary to consider horizontal distributions of artifacts to see if multiple occupations could be spatially segregated across the site. The horizontal, and vertical, distribution of pieces of broken artifacts that can be refitted and be studied in relation to the question of multiple occupations. Numerous fitted pieces were found from the Hawthorn site and their horizontal and vertical distributions are noted in Figure 18 and Table 5. Refitted pieces span all areas of the site and are found among all levels. Building from the assumption that the breakage and discarding of a single tool represents a limited point in time, the distribution of refitted pieces at the Hawthorn site indicates that the entire surface area of the buried site and the vertical extent represent a limited point in time.

FIGURE 18

HORIZONTAL DISTRIBUTION OF REFITTED ARTIFACTS

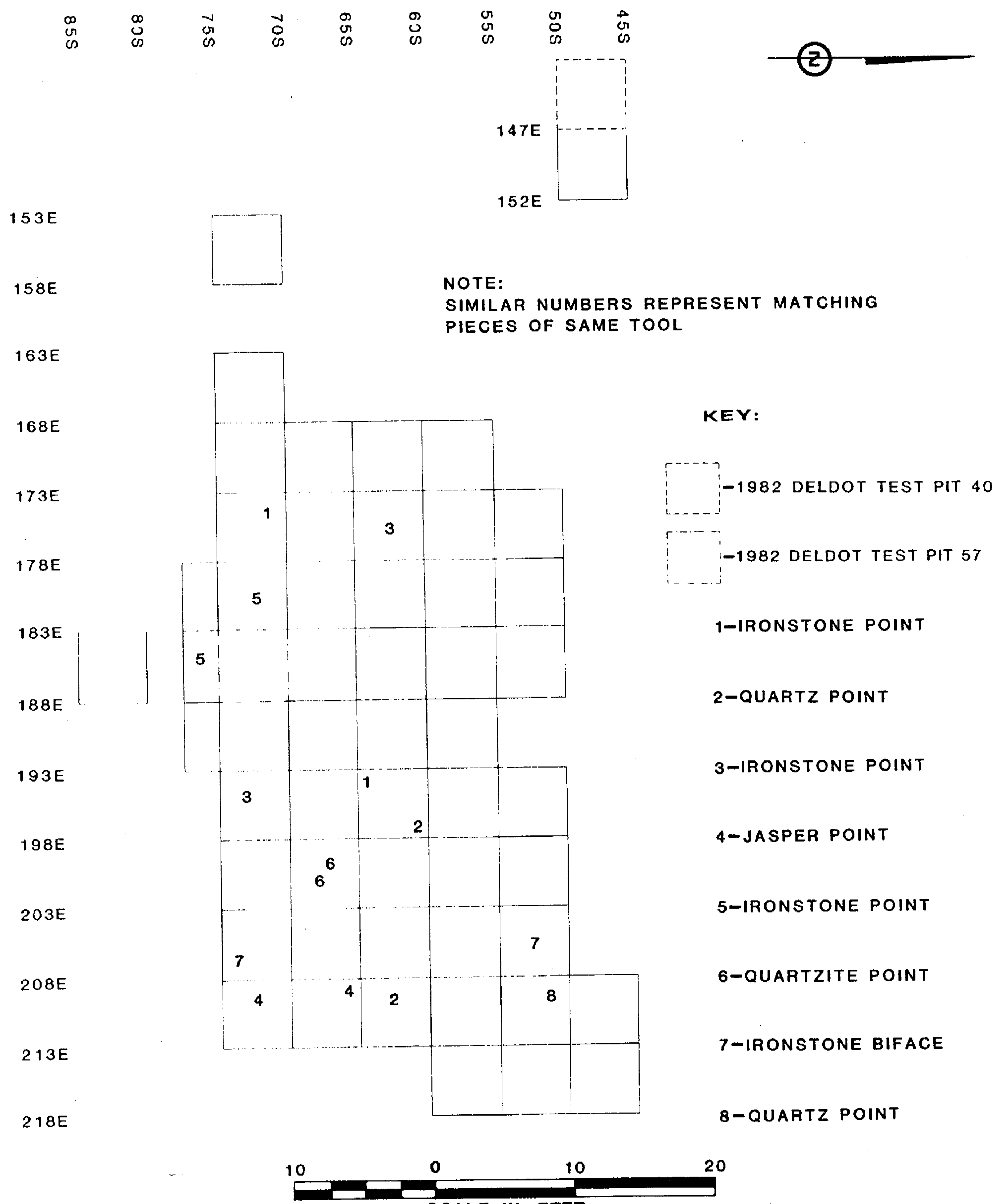


Table 5

Vertical Distribution of Refitted Artifacts

Level	Refitted Pieces (see key to Figure 18)							
	1	2	3	4	5	6	7	8
PZ	X	X	X	X	X	X		
L.2			X	X		X	X	
L.3					X			X

Based on the data presented above, it can be stated that the variety of projectile point styles depicted in Plates 7-9 represent the variety of point styles used at a relatively limited point in time. Certainly, there is no evidence to indicate that the point styles in Plates 7-9 represent separate components spanning centuries, or even decades. Although their context is not as clear, it is also possible that many of the plow-disturbed artifacts depicted in Plates 4-6 are also part of the same limited-duration occupation.

The morphological forms depicted in Plates 7-9 include a variety of sizes within any particular morphological "type". Stemmed points (Plate 9) include both large and small points and these differences in length represent functional and resharpening attributes rather than chronological differences. Similar patterns are noted for other morphological varieties in Plates 7 and 8. The stemmed points noted in Plates 5, 6 and 9 can be placed within the Bare Island/Lackawaxen category (Custer 1983a: Fig. 10) and similar ranges of lengths and shapes are noted by Kinsey (1972: Fig. 116, 1959: 120) in the original type descriptions. Based on radiocarbon dates from numerous sites in the Middle Atlantic, these points could date from anytime between 3000 B.C. and 0 B.C. (Custer 1983a: Figure 10). Notched points are not useful for specifying dates of occupations and may date from any time between 3000 B.C. and 1000 A.D. The few broadspears noted from the site fall into categories (Koens-Crispin, Savannah River, Long, Susquehanna) that have been ascribed dates ranging between 2000 B.C. and 800 B.C. (Kinsey 1972: 395; Kraft 1970: 55-64). The remaining point varieties noted are not diagnostic of any particular time period.

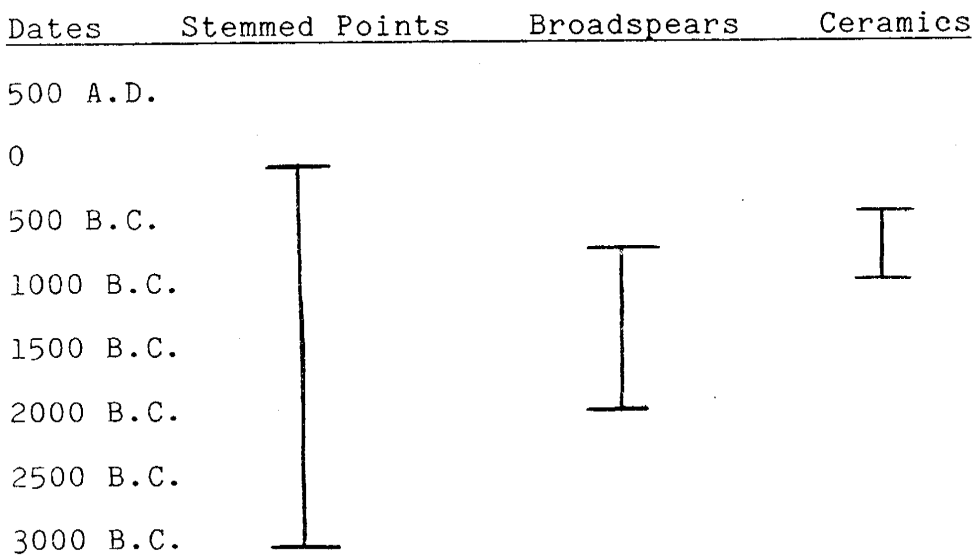
Table 6 shows the time range of diagnostic artifacts from the site. The common time range falls between 1000 B.C. and 750 B.C. This age corresponds well with the inferred age of the soils, which is between 5000 and 3000 years. In sum, the occupation of the Hawthorn site dates to between 1000 B.C. and 750 B.C., the period of transition between the Clyde Farm Complex and the Wolfe Neck Complex within the Woodland I Period. Most of the artifacts represent a single, short-term occupation of the site.

Technologies: Stone Tool Manufacture and Use

This section of the interpretations will describe the processes of stone tool manufacture and tool use that took place at the Hawthorn site. First, the bifaces and projectile points will be considered in light of the tool manufacturing activities that took place at the site. Lithic debitage will also be considered in the context of tool manufacturing activities.

Table 6

Time Ranges of Diagnostic Artifacts



Secondly, the various functions of artifacts found at the site will be discussed.

Four basic categories of bifaces were noted from the Hawthorn site based on the work of Callahan (1979). The first category includes early stage biface rejects, which are bifaces that never passed beyond the first steps of stone tool production due to either material flaws or manufacturing errors. The second category, early stage biface discards, includes bifaces that were used as tools early in their manufacturing/reduction stages and damaged to such a great extent that the biface was discarded. Late stage biface rejects comprise the third category of bifaces and include bifaces broken during the later stages of tool reduction. The final category includes late stage biface discards which are close to finished bifaces damaged during their use as tools. Plates 10 and 11 show all the bifaces of various

Plate 10

A Argillite (83/30/321)
B Chert (83/30/243/29)
C Jasper (83/30/31/3)
D Quartz (83/30/127/26)
E Ironstone (83/30/252)

PLATE 10

EARLY STAGE BIFACES

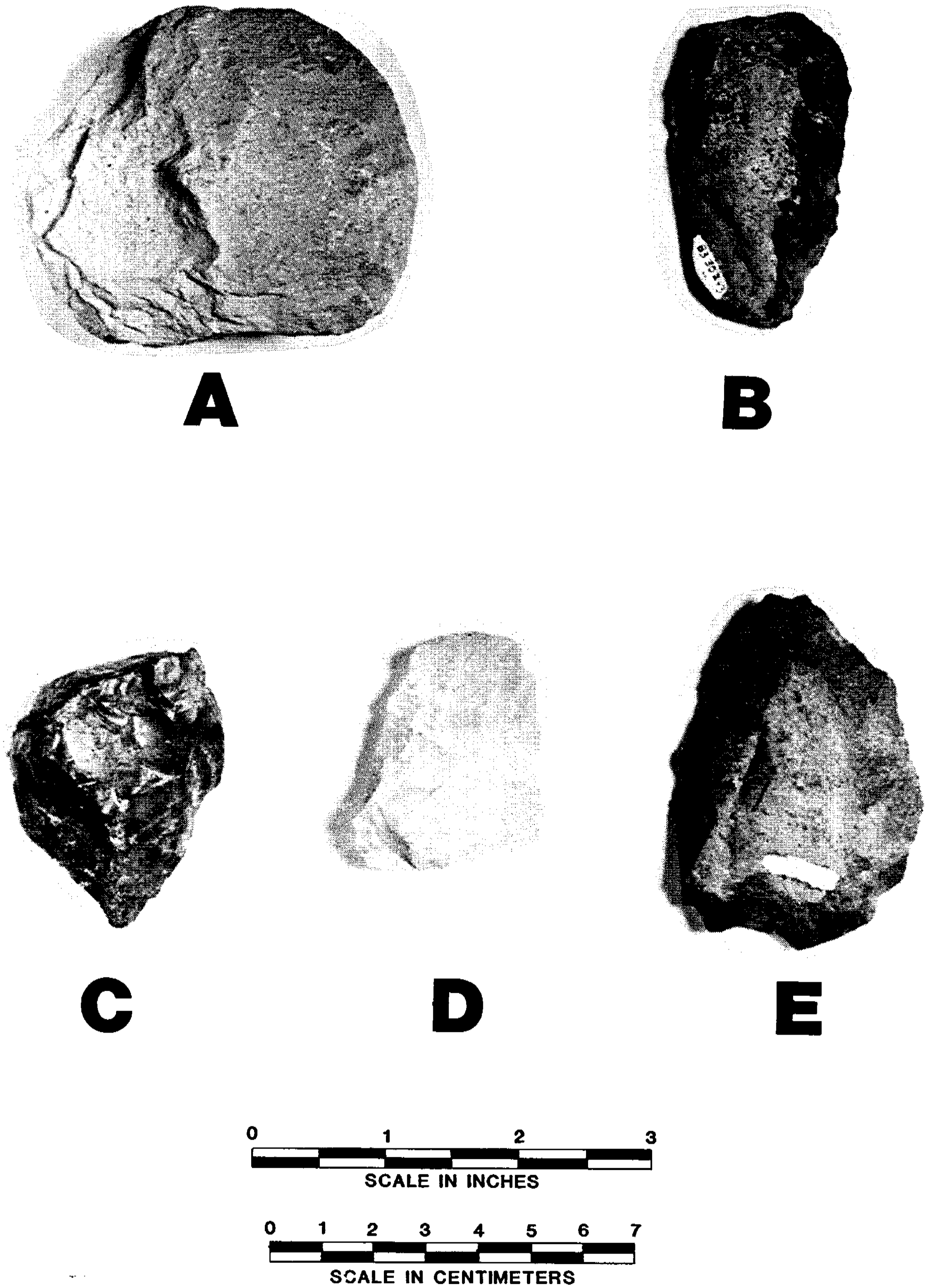
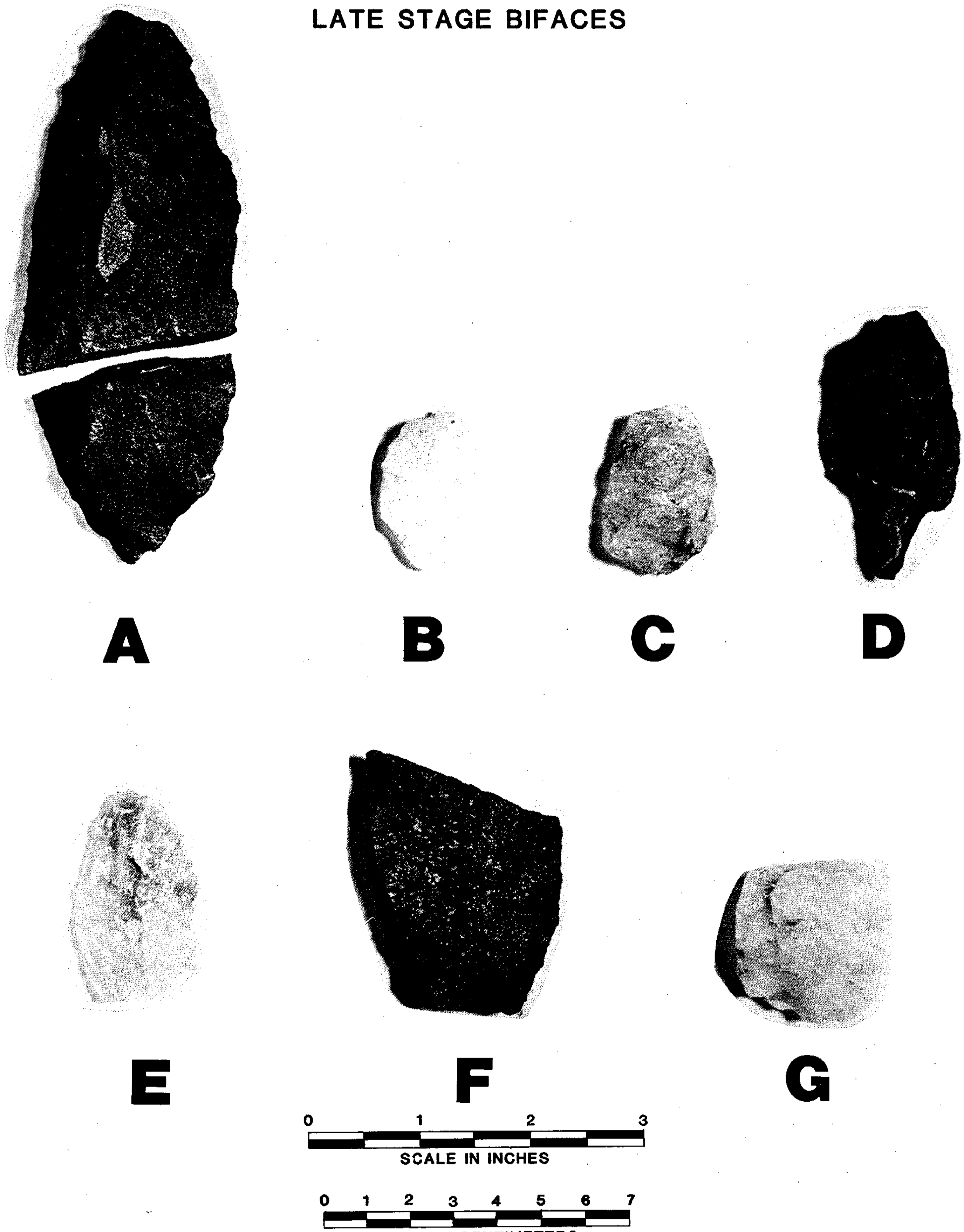


Plate 11

A	Ironstone (83/30/261/26, 83/30/203/31)
B	Quartz (83/30/175)
C	Quartz (83/30/281/17)
D	Chert (83/30/75/27)
E	Quartzite (83/30/178/28)
F	Quartzite (83/30/54)
G	Quartz (83/30/198/20)

PLATE 11

LATE STAGE BIFACES



categories from the site. Projectile points can also be divided into rejects and discards.

Table 7 shows a summary cross-tabulation of the biface and point manufacturing stages and raw materials as well as the presence of cortex. Table 8 shows a more detailed listing. Only early stage bifaces show any presence of cortex, as would be expected, because flaking of later stage bifaces would have removed cortex from the artifacts. It can be seen that there are many more later stage tools than early stage tools. Also, there are twice as many discards as there are rejects. These trends are identical for all lithic materials (Table 7) and indicate that tool manufacturing, especially in its early stages, was not a common activity at the Hawthorn site. The preponderance of discarded tools suggests that points and bifaces were being used for various purposes at the site and damaged. Once damaged, the tools were either directly discarded or an attempt was made to refurbish the working edge of the tool. The presence of late stage biface rejects, and rejected projectile points with evidence of resharpening errors, provides evidence of these unsuccessful tool refurbishing attempts. The very low numbers of early stage bifaces show that there were probably only infrequent attempts to manufacture replacement bifacial tools at the site. All types of raw materials were treated in a similar manner with respect to bifacial tool manufacturing.

Analysis of flake debitage from the excavations shows similar patterns. Table 9 shows the distribution of various types of raw materials and the presence of cortex on the Hawthorn site debitage. Cortex percentages are relatively low and only

Table 7

Summary of Biface/Point Types and Raw Materials

Tool Stage	Quartz	Quartzite	Chert	Jasper	Ironstone	Argillite	Total
early	1(1)	0	1(1)	2(1)	1	1	6(3)
late	8	6	0	6	6	3	29
points	15	8	0	21	11	6	61
TOTAL	24	14	1	29	18	10	96
rejects	4	4	1	9	4	2	24
discards	15	6	0	14	9	5	49
TOTAL	19	10	1	23	13	7	73

(1)-number with cortex

Table 8
Biface/Point Types and Raw Materials

Tool Class	Quartz	Quartzite	Chert	Jasper	Ironstone	Argillite	TOTAL
early stage rejects	1(1)	0	1(1)	1(1)	1	0	4(3)
early stage discards	0	0	0	0	0	1	1
late stage rejects	1	2	0	1	0	0	4
late stage discards	2	0	0	0	1	0	3
discarded points	13	6	0	14	8	4	45
rejected points	2	2	0	7	3	2	16
middle/late biface frag.	5	4	0	5	5	3	22
early stage biface frag.	0	0	0	1	0	0	1
TOTAL	24(1)	14(1)	1(1)	29(1)	18	10	96(3)

one material type, chert, has greater than 25% cortex. This low percentage would further support the contention that early stage stone tool production was not a common activity at the site.

Table 9

Debitage Cortex and Raw Material

Cortex Presence	Quartz	Quartzite	Ironstone	Jasper	Chert	Argillite	Other
Cortex Absent (% of raw material)	5137 (83%)	767 (80%)	545 (81%)	1479 (82%)	369 (69%)	87 (92%)	99 (98%)
Cortex Present	1074 (17%)	197 (20%)	131 (19%)	316 (18%)	169 (31%)	8 (8%)	3 (2%)
TOTAL	6211	964	676	1795	538	95	102
% total material	60%	9%	6%	17%	5%	1%	2%

The debitage from the site noted in Table 9 was not only derived from bifacial tool production and edge refurbishing. Numerous flake tools are noted in Appendix II and many of the flakes were probably produced from either bifaces or cores for use as tools themselves. Table 10 shows the flake tool distributions among the various materials and the presence of cortex on flake tools. Almost half of the flake tools show cortex indicating that cobbles were being reduced as core sources of flakes for tools. Small debitage from the resharpening of tools' edges were also recovered from the flotation samples. Table 11 summarizes the distribution of the raw materials among the small resharpening flakes. No cortex was noted on any of the small debitage and the raw materials distribution among the small debitage is similar to that of the larger debitage.

Table 10

Flake Tools by Raw Materials and Cortex

Quartz	Quartzite	Chert	Jasper	Ironstone	Argillite	Other	Total
10(1)	5(4)	2(1)	10(4)	0	0	1	28(10)
35%	17%	7 %	35%	0%	0%	6%	

Table 11

Raw Materials among Flakes in Flotation Samples

	Quartz	Quartzite	Chert	Jasper	Argillite	TOTAL
Count	846	26	315	42	3	1232
%	69	2	25	3	1	100

The varied use of different raw materials for various tool classes can be analyzed to see if any lithic raw materials were used for special purposes. Table 12 shows the percentages of raw materials among various tool classes. Also included in Table 12 are percentage data on the local cobble resources. Samples of cobbles were taken from all excavation units and analyzed for raw materials and potential workability. Appendix V notes the individual sample data and a summary is included in Table 12. Table 13 shows the same data in a slightly different form and lists the rank order of raw materials by artifact class, and cobble samples, from most commonly used to least commonly used.

Numerous patterns can be noted in lithic raw material utilization. Jasper and quartz are the most commonly utilized materials in all artifact classes although jasper was uncommon among the locally available cobble sources (Table 12). Quartz, however, is the most common material among the locally available cobbles. The low percentages of artifacts with cortex and the low incidence of early stage tool production activities suggested earlier indicates that local cobble sources were not used to manufacture replacement bifacial tools at the Hawthorn site.

Table 12

Summary Percentages of Raw Materials by Artifact Classes

Artifact Class	Quartz	Quartzite	Chert	Jasper	Ironstone	Argillite	Other
Early stage bifaces	16	--	16	32	16	20	--
Late stage bifaces	28	21	--	21	21	0	--
Points	24	13	--	34	18	11	--
Rejected bifaces and points	16	16	4	38	16	10	--
Discarded bifaces and points	31	12	--	29	18	10	--
Flake tools	35	17	7	35	--	--	6
Debitage	60	9	5	17	6	1	2
Flotation debitage	69	2	26	3	--	1	--
Local cobbles	71	11	1	1	--	--	15
Workable local cobbles	44	44	6	3	--	--	3

Table 13

Rank Order Material Preferences by Artifact Class

Artifact Class	Raw Materials
Early stage bifaces	J, A, C, Q, I, O, Qz
Late Stage bifaces	Q, Qz, J, I, A, C, O
Points	J, Q, I, Qz, A, C, O
Rejected bifaces and points	J, Q, I, Qz, A, C, O
Discarded bifaces and points	Q, J. I, Qz, A, C, O
Flake tools	J, Q, Qz, C, O, I, A
Debitage	Q, J, Qz, I, C, O, A
Flotation debitage	Q, C, J, Qz, A, I, O
Total cobbles	Q, O, Qz, C, J, I, A
Workable cobbles	Q, Qz, C, J, O, I, A

Key: J-jasper, A-argillite, C-chert, Q-quartz, I-ironstone, Qz-quartzite, O-other

However, the higher incidence of cortex on flake tools, which are mainly quartz and jasper, indicates that perhaps local cobbles provided a source of flakes for use as expedient tools. Non-local raw materials, such as ironstone and argillite which are found in the Upper Chesapeake Bay (Ward 1983) and Middle Delaware River Valley (Kinsey 1975) respectively, are not used for manufacturing flake tools although small debitage from resharpening argillite tool edges are noted in the flotation samples. Ironstone, especially, is a material used commonly for bifaces and projectile points, and both rejected late stage ironstone tools broken in resharpening and broken discarded ironstone tools are present (Table 12). The general pattern of lithic utilization thus seems to be one in which a series of prepared bifacial tools were brought into the site, utilized as tools, broken, and discarded immediately or after an unsuccessful attempt at resharpening. At the same time, local cobbles were probably utilized as core sources for flake tools. Finally, some small amount of early stage stone tool manufacturing took place using local materials, or perhaps early stage bifaces brought into the site were reduced to provide replacement tools. A large ironstone early stage biface reject (Plate 11A) found at the site may represent one of these curated (Binford 1979) tools. In general, the tool production and manufacturing activities evident at the site suggest that the occupation was of a short duration. At least the people utilizing the site were not there long enough to bother to manufacture tools to replace those broken at the site.

Numerous insights into activities which took place at the Hawthorn site can also be gained by considering the functions for which tools may have been used. Determination of stone tool use was accomplished by looking at edge wear and tool damage. Analysis of gross morphology and wear patterns observable without magnification was carried out using the methods and techniques described by Ahler (1971). Low power magnification (20x) study of edge wear was also undertaken using the techniques described by Wilmsen (1970), Odell (1980; Odell and Odell-Vereecken 1980), and Semenov (1964). High-power magnification studies (e.g. -

Keely 1980) were not undertaken. It should be noted that these studies were somewhat hampered by the grainy, non-cryptocrystalline nature of the lithic materials utilized as tools. Nevertheless, information on tool function could still be gathered.

One ground stone tool, a grooved axe, was found at the Hawthorn site (Plate 12) and was analyzed for use wear. There is very heavy wear on the bit end and evidence of severe battering typical of most axes used for chopping. The small size of the axe suggests that it has been heavily resharpened and is probably a discard. The cross-section of the axe is somewhat unique with its plano-convex shape. It is possible that the tool was made from a longitudinally-split cobble; however, examination of the flat side of the axe shows some additional interesting wear patterns. There are numerous scratches running parallel to the long axis of the tool that suggest that the axe was also used for grinding or crushing with a scraping motion parallel to its long axis. The axe was found close to the two features that were thought to be related to processing of hickory nuts and/or seeds and may have been used in these activities. Because its axe bit is so heavily damaged and reworked, this tool could have been recycled for use as a grinding tool after its utility as an axe had been exhausted.

Projectile points from the Hawthorn site show evidence of a wide range of uses beyond that of projectile points. Some of these artifacts have tip impact fractures that clearly show their use as spear points (eg. - Plate 5H,K; Plate 7B, K). However, others were clearly used for other purposes. A series of quartz

PLATE 12

GROUND STONE AXE

OBVERSE

REVERSE

(83/30/198/26)

0 1 2 3

SCALE IN INCHES

0 1 2 3 4 5 6 7

SCALE IN CENTIMETERS

side-notched points (Plate 4B, D; Plate 5D, Plate 6D; Plate 7A, L-O, Q; Plate 8F) have asymmetrically excurvate edges, indicative of resharpening, as well as considerable rounding and crushing of edges and flake scar ridges along their lateral edges. Ahler (1971) notes that this kind of wear is indicative of use as butchering knives. Transverse fractures are also present on these tools (Plate 6D; Plate 4D) and such fractures are also related to cutting and prying motions. This combination of variables suggests that these tools were used as knives, and probably were hafted. Unfortunately, the kinds of wear patterns that can be used to discern the materials cut with these tools are not discernible on the quartz material from which these tools were made. Nonetheless, the crushing of edges suggests cutting of something hard such as bone or antler, and these tools may have been butchering or animal product processing tools. Other varieties of points show similar wear patterns and were probably used for similar functions (Plate 4E, F; Plate 5F, L; Plate 6A).

Another distinctive tool class includes a series of long, narrow-bladed ironstone points (Plate 5B, J; Plate 9G, H) that have transverse fractures midway on their blades. It is difficult to discern any wear patterns on this material; however, the snapped blades have been related to prying actions that occur during butchering (Ahler 1971). Broadspears from the site show considerable use as cutting tools including transverse fractures (Plate 7F) and asymmetrically resharpened lateral edges (Plate 4F). In one case a broadspear with a transverse fracture (Plate 7F) was resharpened for use as a scraper. Scratches perpendicular to the tool edge were observed under low-power magnification and underscore its identification as a scraper. These tool use patterns for broadspears support contentions from other studies (Cook 1976a) that suggest that broadspears were multi-function processing tools rather than projectile points. In sum, the points from the site were used for a variety of functions, most of which are related to butchering. Quartz and ironstone points seem to be used for the widest variety of cutting functions. The presence of mainly transverse fractures and the absence of ironstone resharpening debitage in the flotation indicates that the ironstone stemmed points were used for a different class of cutting activities compared to the extensively resharpened quartz side-notched cutting tools. It is hypothesized here that the ironstone points were used for the initial stages of butchering where larger tools with "tough" edges were needed. On the other hand, the sharper quartz knives may have been used in later butchering stages. Whatever the case, two different types of cutting activities took place at the site.

Analysis of bifaces did not provide much functional information. One large argillite early stage biface (Plate 10A) shows a great deal of edge battering that may be related to smashing of bones for marrow, or similar activities. One late stage quartzite biface (Plate 11E) showed a transverse fracture indicative of cutting activities.

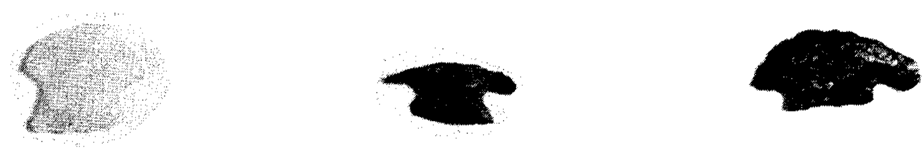
A special class of stone tools recognized at the Hawthorn site includes a number of hafted scraping tools depicted in Plate 13. Two are manufactured from jasper and one is made from

Plate 13

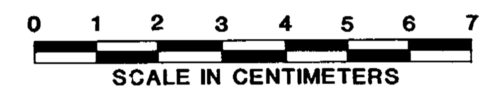
A   Quartz (83/30/172/26)
B   Jasper (83/30/67/23)
C   Jasper (83/30/175)

PLATE 13

HAFTED SCRAPERS



A B C



quartz. These are not resharpened projectile points because they are only unifacially flaked. The presence of side or corner notches would indicate that they were hafted in some kind of handle. Edge angles of the tools are between 80° - 90° and their working edges are badly crushed and battered. Step fractures are common across the steep face of the tool directly above the working edge. Wilmsen (1970:71) and Odell (1980:411) note that these patterns of edge shape and wear are related to tools used in wood working, bone working, or heavy shredding of soft material on a hard anvil, although the first two options are the most likely. Given the small size of the artifacts and the proximity of the working elements, these tools can be characterized as discarded, exhausted tools. Keely (1982) notes similar characteristics for what he calls "once-hafted" tools.

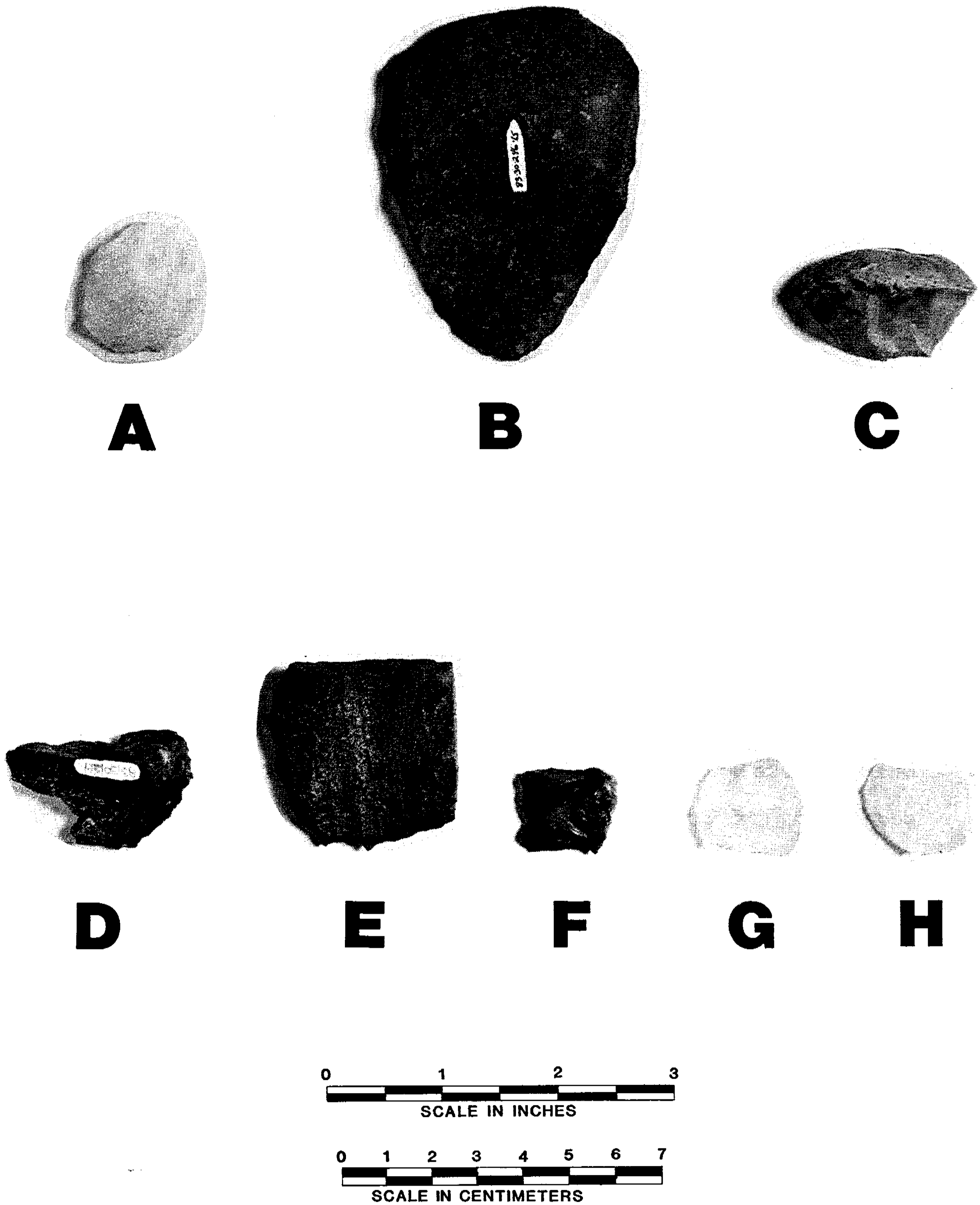
A series of 19 flake tools with no notches or hafting elements show similar edge angles and/or wear patterns to the hafted tools described above and several samples are depicted in Plate 14. Of these 19 tools, 9 are quartz, 8 are cryptocrystalline (chert or jasper), one is quartzite, and one is rhyolite. Half have cortex. Only in the cases of the cryptocrystalline tools can any wear patterns be discerned, although the quartz and quartzite tools show sufficient edge crushing to suggest that they were used for wood and/or bone working. The cryptocrystalline tools clearly show scratches perpendicular to the working edge that further suggest scraping use on wood or bone. It is interesting to note that many of these flake tools have considerable room for further

Plate 14

A Quartz (83/30/200/11)
B Quartzite (83/30/246/15)
C Jasper (83/30/160/26)
D Jasper (83/30/214)
E Rhyolite (83/30/1281/7)
F Jasper (83/30/164/4)
G Quartz (83/30/299/19)
H Quartz (83/30/62/26)

PLATE 14

END SCRAPERS



resharpening, but were apparently discarded before their use potential was exhausted. Also, multiple tools are absent. Although the wear is generally heavy, in a few cases (eg. - Plate 14C) the scraping tools were not used for long, or resharpened very often, before they were discarded. This pattern suggests that they were manufactured quickly and simply for use as expedient tools. Keely (1982) notes that these characteristics are common on tools with no indications of hafts. The presence of cortex on many of these tools indicates that they were manufactured from local cobble cores, which are common from the site. The shapes of these tools, which are somewhat odd and irregular, indicate that they were not necessarily manufactured from carefully prepared flakes, but are manufactured from odd-shaped fragments or smashed cobbles.

Another class of flake tools from the site includes three large flakes retouched along their lateral edges (Plate 15). The edge angles along the retouched edges are less than 40^{o} and there are no signs of edge crushing of rounding of flake scar ridges. Unfortunately, the raw materials are too grainy to see any scratching or polishing of edges under low power magnification. Nonetheless, the large size, low edge angles, and placement of cutting edges along lateral flake margins are attributes of unhafted cutting or slicing tools (Semenov 1964:101-107; Wilmsen 1970:71-74; Keely 1982). The three remaining retouched flakes that fall into the flake tool category do not fall into any clear-cut tool categories based on edge angles or wear patterns.

In sum, the flaked stone tools from the Hawthorn site reveal that groups came to the site with a prepared tool kit of bifacial

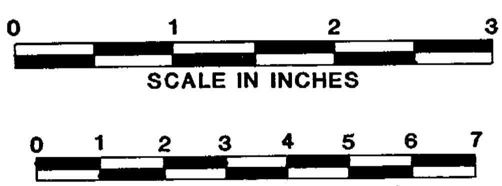
Plate 15

A Quartz (83/30/90/26)
B Quartzite (83/30/213/27)
C Quartzite (83/30/229)

PLATE 15

FLAKE KNIVES

A **B** **C**



tools that could be used for multiple purposes. These tools were mainly in later stages of reduction, although a few early stage tools were also probably part of their inventory, and included a few exotic non-local materials. While at the site they hunted game, probably white-tailed deer, and processed their products with cutting and scraping tools from their prepared tool kits as well as with expedient tools manufactured at the site from local cobbles. Plant resources were also processed at the site. As tools were broken, some were immediately discarded. Resharpening of other broken tools was attempted, sometimes unsuccessfully. Very little manufacturing of new tools was undertaken. Some processing of hickory nuts and seed plants also took place. In general, the activities carried out at the site involved short term processing of plant and animal resources.

Activity Areas

The spatial distribution of the activities noted above can be studied to see if clear-cut activity areas could be discerned. The method used here to determine activity areas was to plot the frequencies of occurrence of artifact classes related to the functions noted above. These frequency plots were then converted to contoured density maps by interpolation using methods that have been successfully applied to other sites in the local area (eg. - Custer et al 1981). Clustering of artifact classes was not studied statistically using nearest neighbor techniques or dimensional analysis of variance (Whallon 1973) for a number of reasons. First, individual piece plotting of all artifact classes was not undertaken and this is a requirement for application of nearest neighbor analysis. Secondly, the configuration of the grid of the excavated area did not match the square or 2x1 rectangular grid configuration required for dimensional analysis of variance. The grid shape requirement could be met by adding "dummy" squares or by dropping squares from consideration; however, the squares which would have been dropped from consideration (208E50S, 213E55S) contained interesting data that it was desirable to include. Also, the inclusion of dummy squares with zero values adjacent to squares with high artifact frequencies, such as along the 213E line, would have skewed the distributions. Therefore, these statistical techniques were not used.

For the purposes of plotting artifact distributions, only excavated levels within the undisturbed soils were considered. Artifacts from within the buried plow zone were not included. Because cross-mended artifacts from several arbitrary excavation levels were present (Table 5), because the buried, undisturbed soils represent a single depositional event, and because the site has been interpreted as a single short-term occupation, all arbitrary excavation levels within the buried horizon were lumped together for the analysis of activity areas.

The map of the features, which was presented earlier (Figure 14), provides a starting point for the analysis of activity areas. The northwest corner of the site can be viewed as a possible habitation/temporary residence area and the southern border of the southeastern portion of the site is a possible seed/nut processing area. The distribution of ecofacts recovered from the flotation confirms the presence of a nut/seed processing area. Figure 19 shows the distribution of charred hickory nut fragments, chenopodium, amaranth, and hackberry. These ecofacts cluster around the one processing feature and the area slightly to its northeast. The grooved axe which had been reused as a grinding tool was also found in this area (see Figure 19). This portion of the site also has the major concentration of charred nut hulls observed from general excavations (Figure 20). Distribution of general charred wood from the flotation samples also shows a concentration in this area (Figure 21). Finally, the southeastern corner of the site has the largest concentration of fire-cracked rock (Figure 22) indicating the presence of hearths. In sum, the southeastern corner of the site (Area I - Figure 25) seems to be a major area for processing of nuts, primarily hickory, and seeds through roasting and/or grinding. This area also contained most of the hearths or firepits found at the site.

Analysis of tools and debitage shows the presence of additional activity areas and also adds some additional activities to the nut/seed processing area. Figure 23 shows the distribution of bifaces and flake tools of various types and Figure 24 shows the distribution of points of various functions and morphologies. The eastern portion of the site, especially the northeast corner, has a major concentration of end scrapers, hafted scrapers, late stage biface rejects and discards, and a few early stage biface rejects (Figure 23). Quartz side-notched knives, points with transverse fractures, and general discarded points are also concentrated in this area (Figure 24).

FIGURE 19

DISTRIBUTION OF ECOFACTS FROM FLOATATION

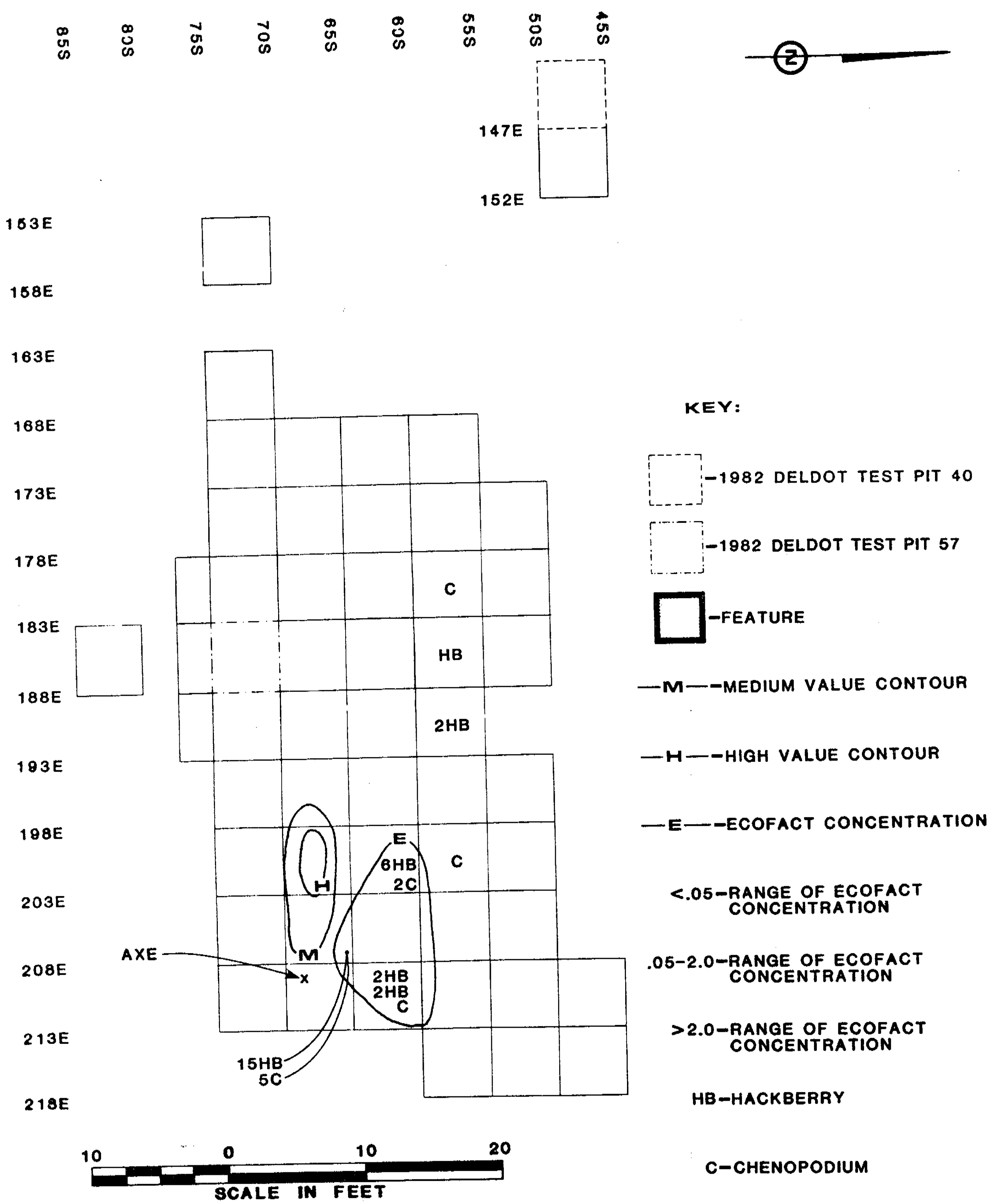


FIGURE 20

CHARRED NUT HULL CONCENTRATION FROM GENERAL EXCAVATION

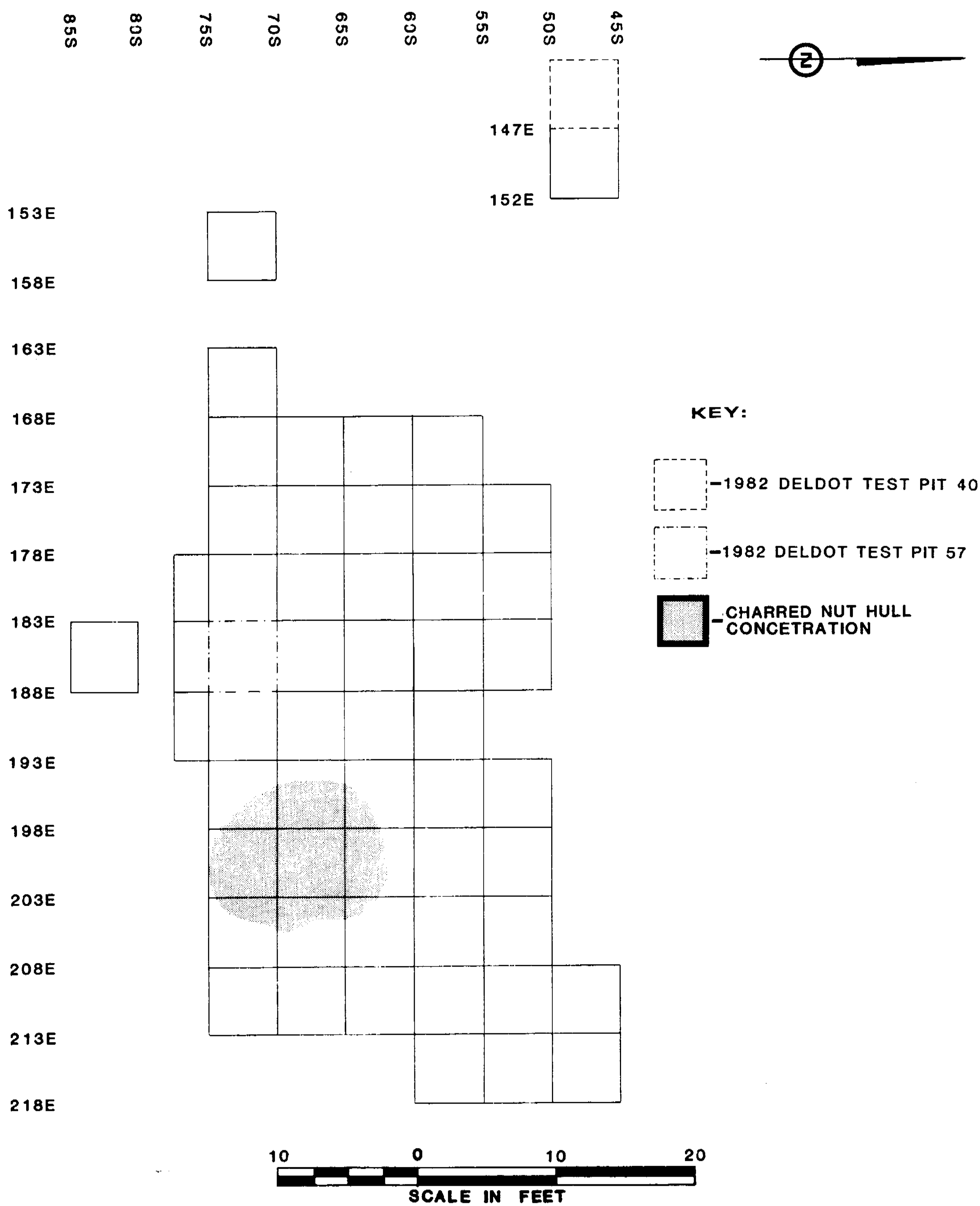


FIGURE 21

DISTRIBUTION OF CHARCOAL FROM FLOATATION

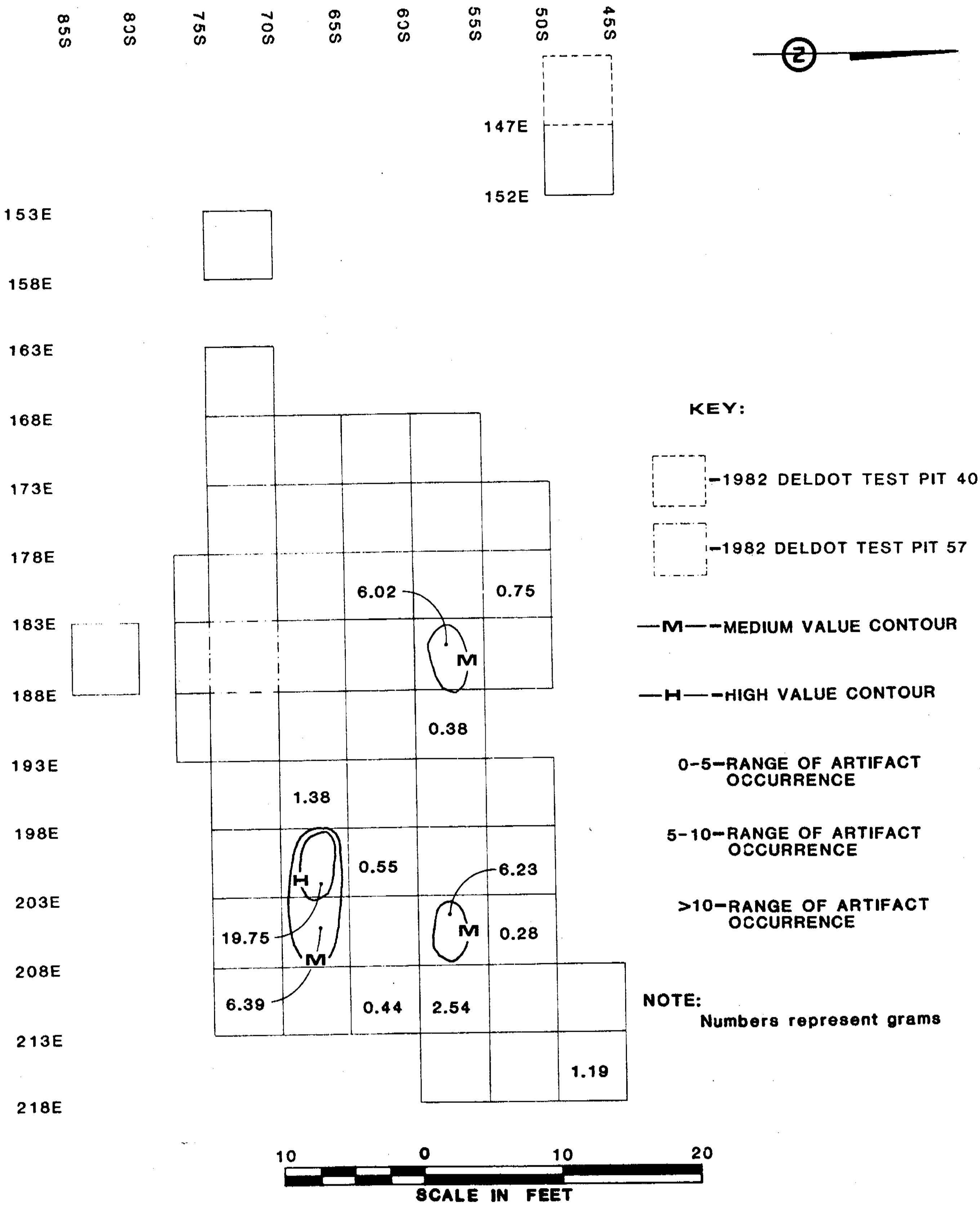


FIGURE 22

DISTRIBUTION OF FIRE-CRACKED ROCK

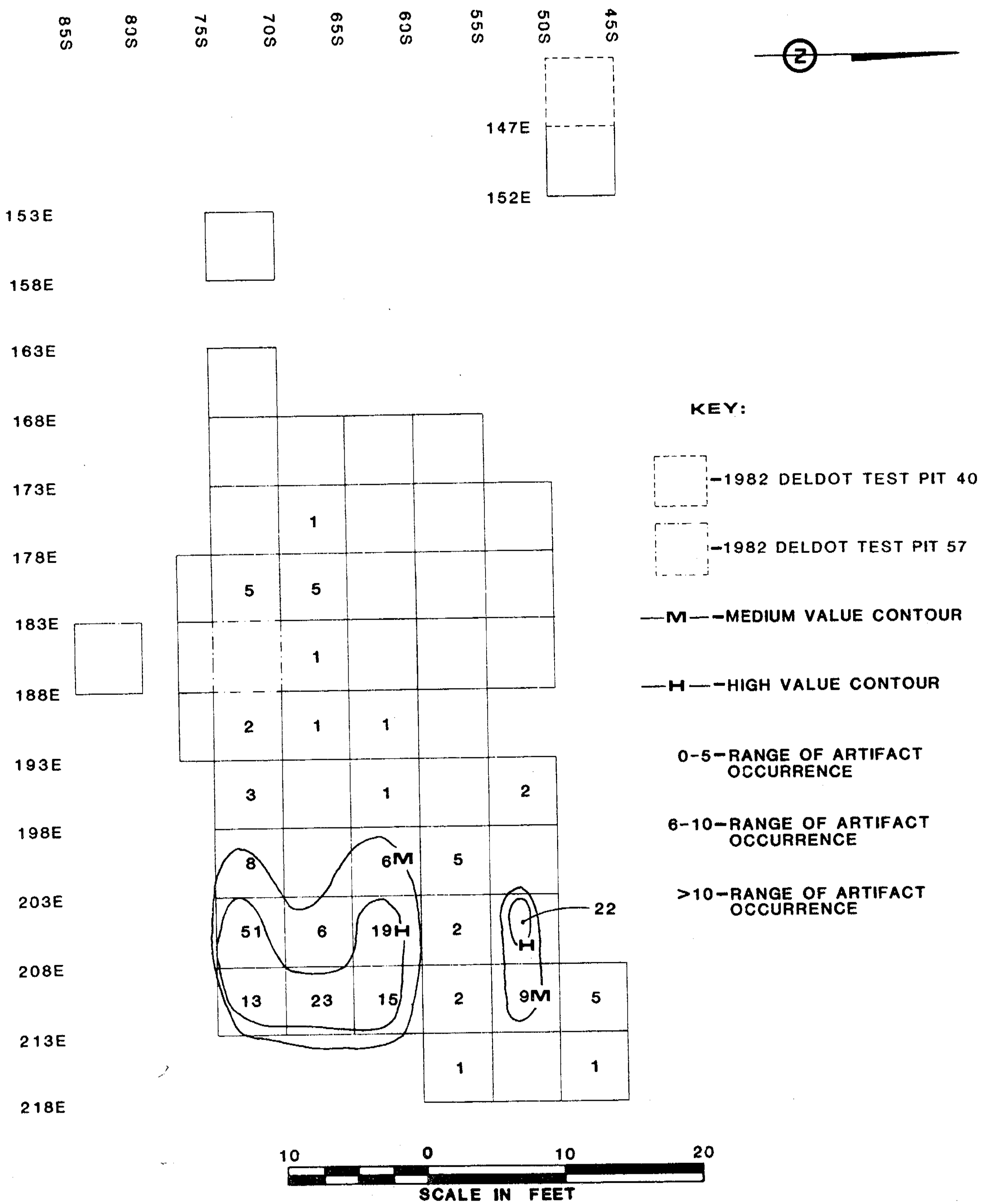


FIGURE 23

DISTRIBUTION OF BIFACES AND FLAKE TOOLS

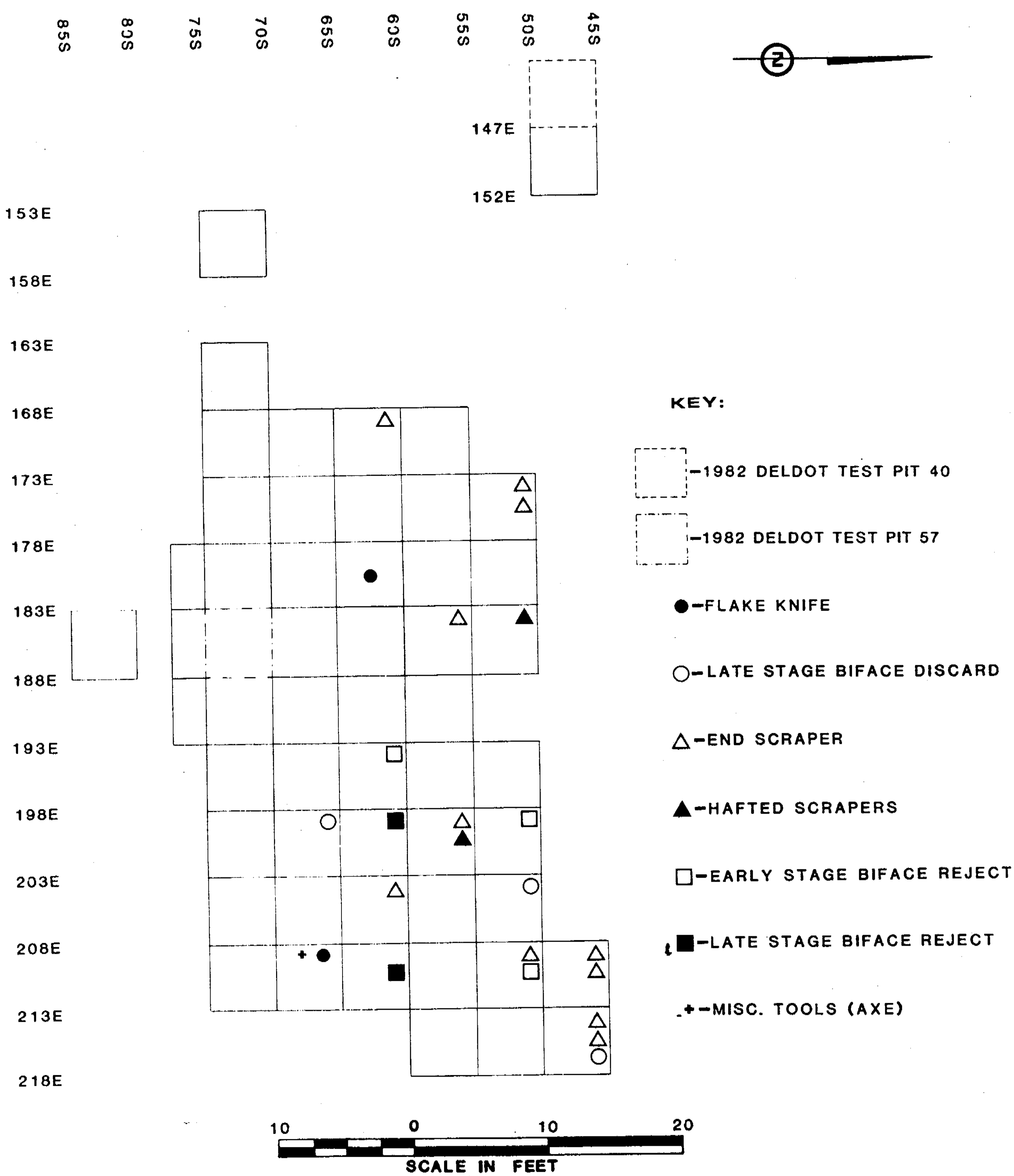


FIGURE 24

DISTRIBUTION OF POINTS OF VARIED FUNCTIONS

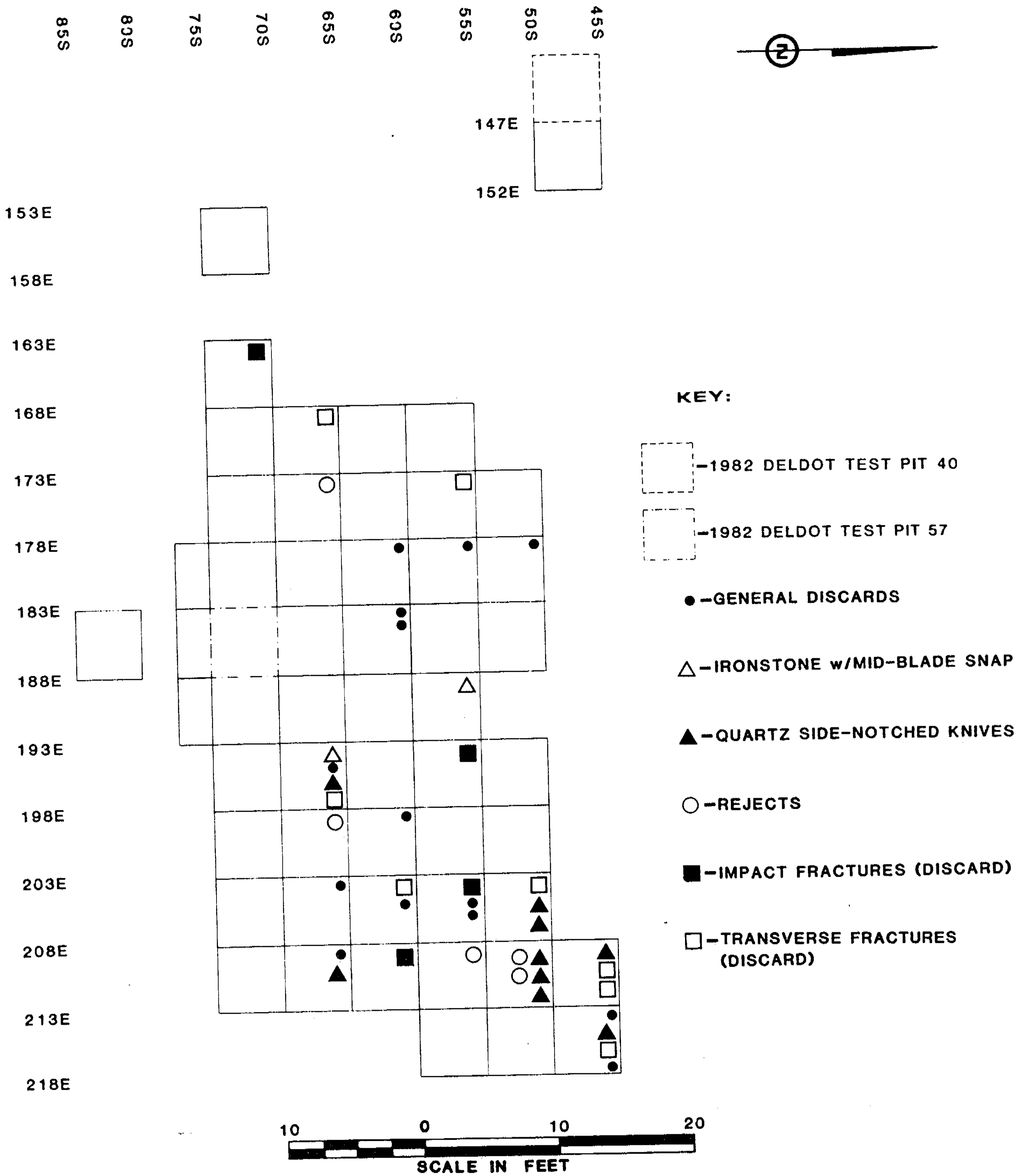
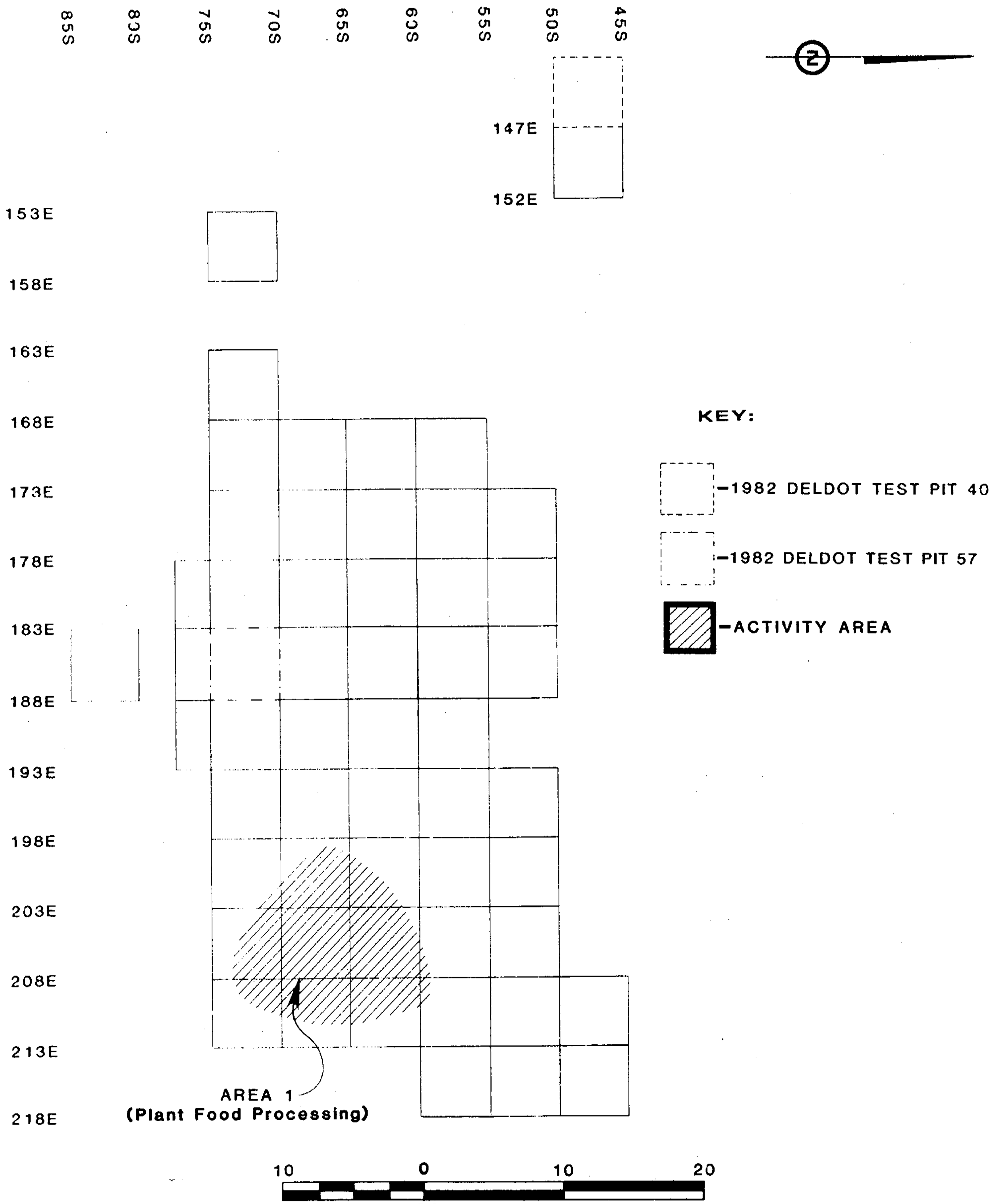


FIGURE 25

ACTIVITY AREA 1



Activities associated with this section of the site (Area II - Figure 26) would include slicing and cutting, probably associated with butchering, and wood or bone working, probably associated with the processing of the products of the hunted game. Tools broken in use (including points with impact fractures that may have been embedded in the game animals), damaged in resharpening, or damaged during the infrequent manufacturing or replacements were all discarded in Area II as well.

Another clustering of discarded tools can be seen in the northeast corner of the site adjacent to the tent structure (Area III - Figure 27). These tools may have been taken to the structure area, assessed for further resharpening potential, and then discarded. Similar tool discard patterns have been noted at the Green Valley Site Complex (Custer et al 1981), a quarry-related base camp in the local area, and the Thunderbird site (Gardner 1974), a quarry-related base camp in western Virginia. Keely (1982:808) notes that the spatial segregation of discards, such as the difference between Area II, a work area, and Area III, a habitation area, may be indicative of "retooling", i.e. specialized replacement of specific tools from a curated tool kit, away from actual work areas. From this perspective, the discarded tools in Area II would represent discarding, resharpening, and replacement activities occurring at the same time, and place, as the actual butchering and processing activities. On the other hand, the tools that were discarded in Area III may have been discarded slightly later when tool kits were assessed and refurbished after the actual butchering and

FIGURE 26

ACTIVITY AREA 2

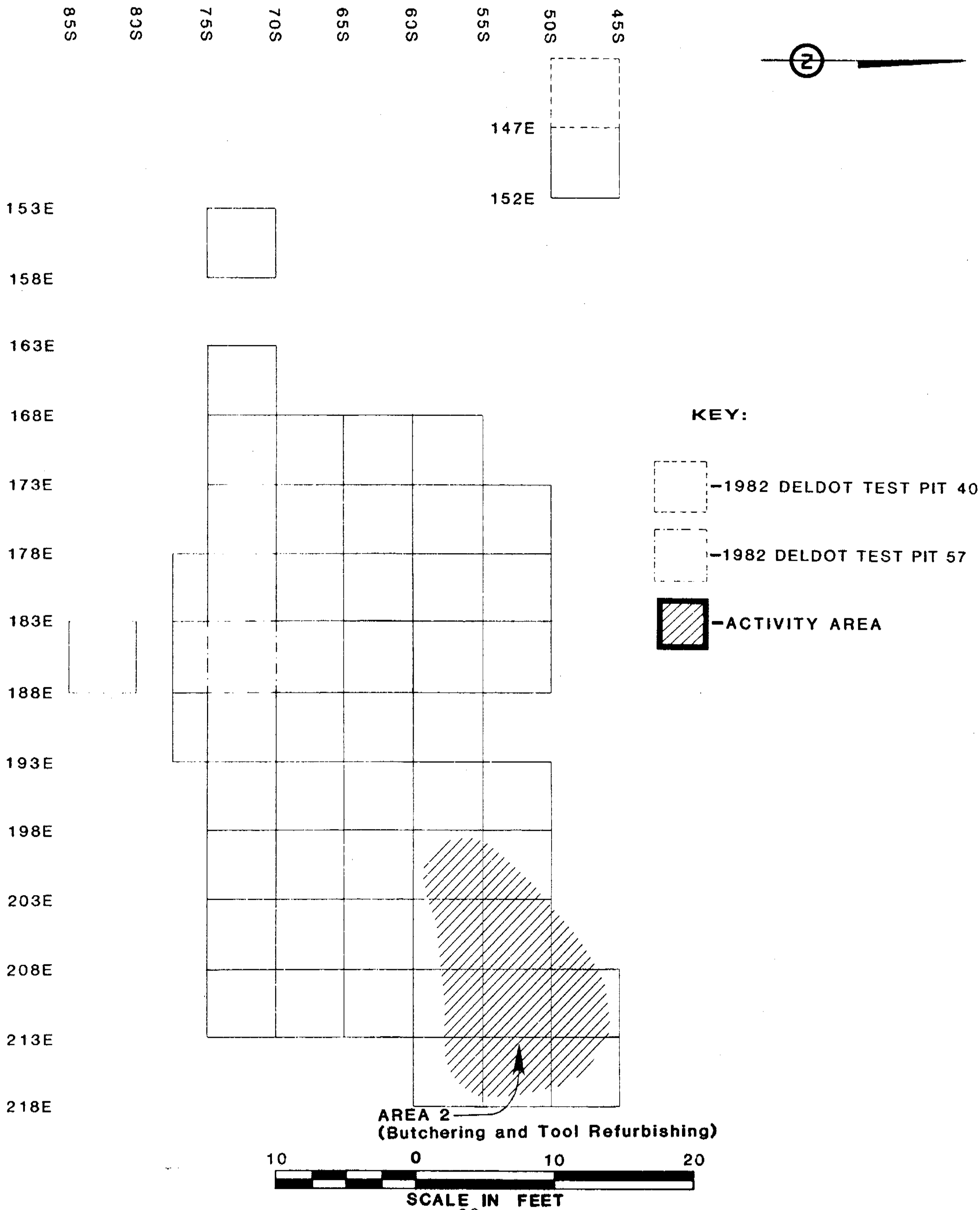
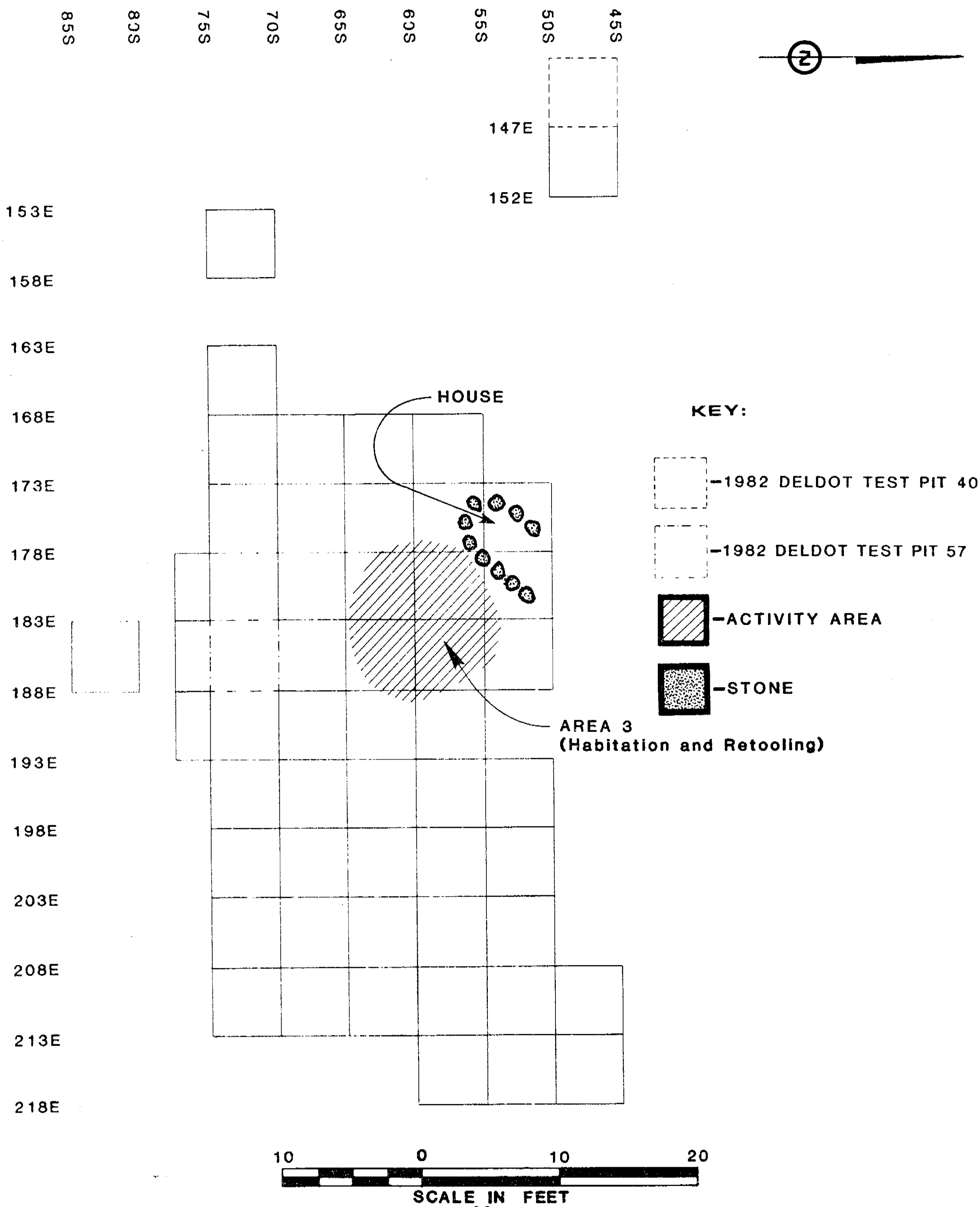


FIGURE 27

ACTIVITY AREA 3



processing took place. It is possible to speculate that this activity took place close to the time of site abandonment.

Analysis of the distribution of debitage across the site reinforces the above interpretations and adds additional insights. Figure 28 shows the overall distribution of debitage from the excavations and Figures 29 - 33 show the distribution of the various raw materials found at the site. The distribution of total debitage (Figures 28) covers all three major activity areas with concentrations at each of the three areas. The distribution merely indicates that the activities in all areas produce some kind of debitage either from tool refurbishing, tool production, or production of unmodified flakes for tools. Analysis of various raw materials, however, reveals additional patterning.

Figure 29 shows the distribution of quartz and quartzite debitage and the distribution is similar to that seen for total debitage. Figure 30 shows the distribution of cryptocrystalline debitage which is somewhat similar to the overall distribution. Two minor concentrations are coterminus with Areas II and III and a third major concentration is noted in the vicinity of Area I. The meaning of the association of cryptocrystalline debitage with the plant processing activity area is not clear; however, some further analysis shows additional data. Figure 34 shows the distribution of debitage with cortex and one concentration is coterminous with Area I. Also, Figure 35, which shows the distribution of cores, shows a clustering in Area I. These associations indicate that production of flakes from cryptocrystalline cores took place in Area I in addition to plant

FIGURE 28

DISTRIBUTION OF TOTAL DEBITAGE

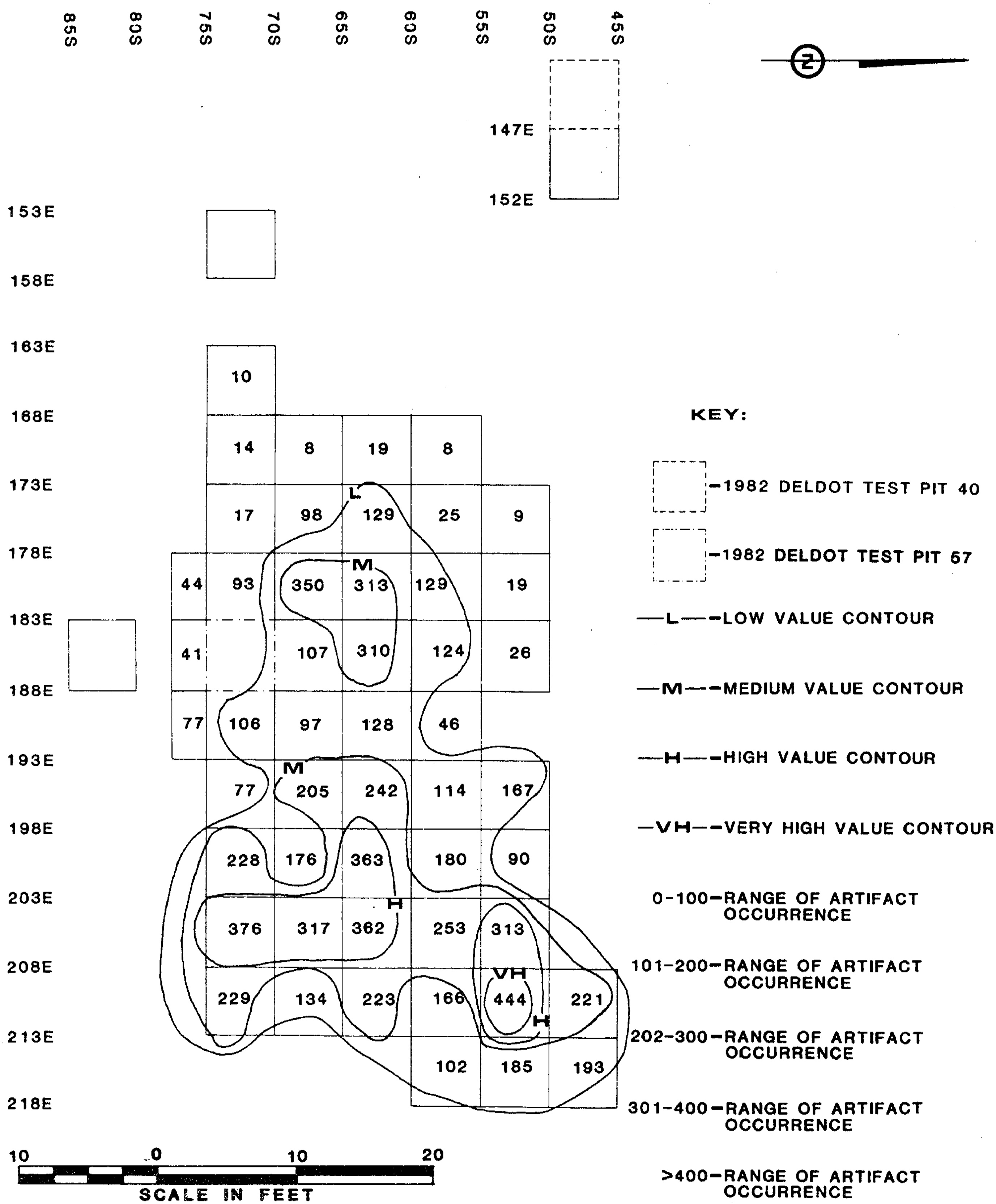


FIGURE 29

DISTRIBUTION OF QUARTZ AND QUARTZITE DEBITAGE

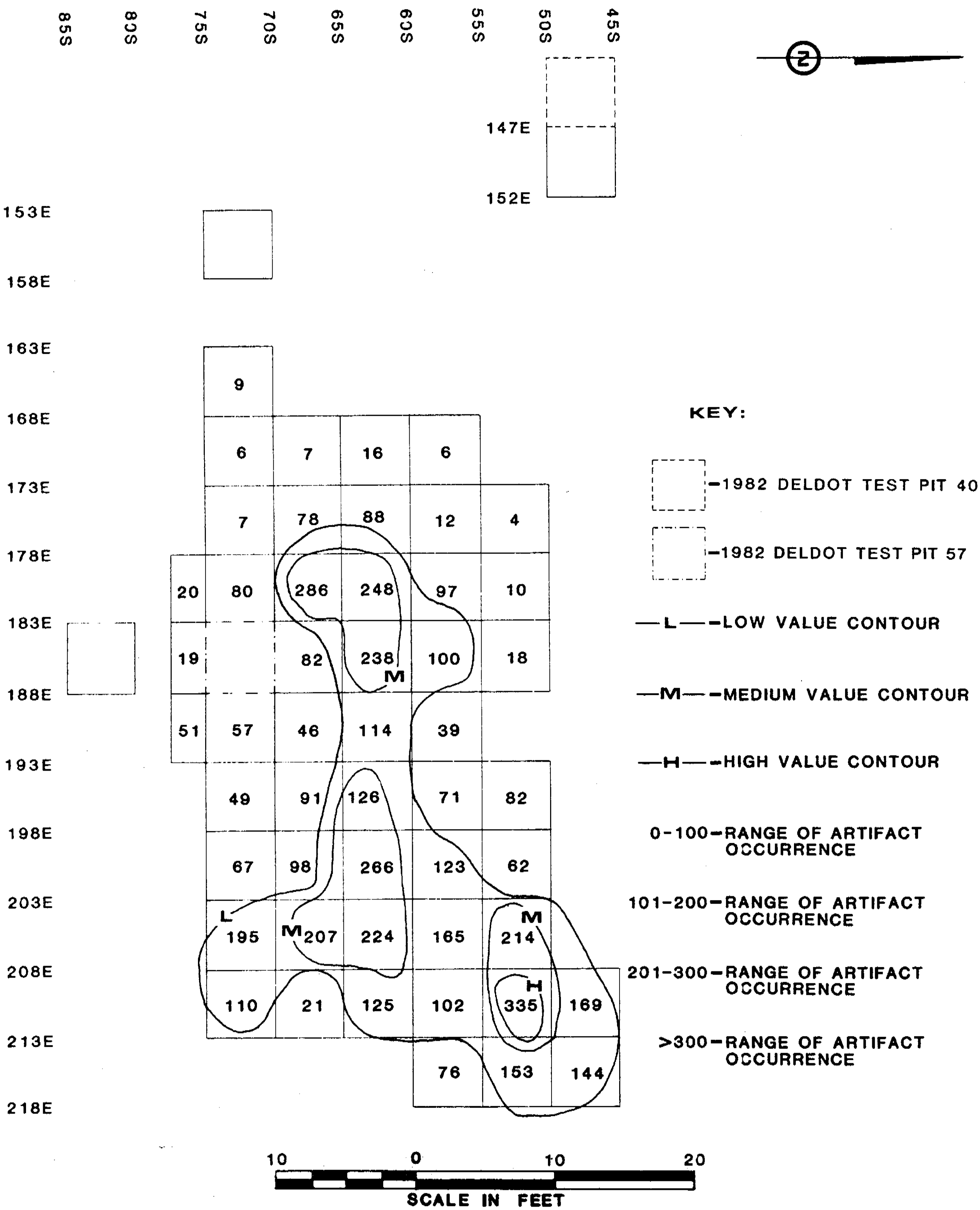


FIGURE 30

DISTRIBUTION OF CRYPTOCRYSTALLINE DEBITAGE

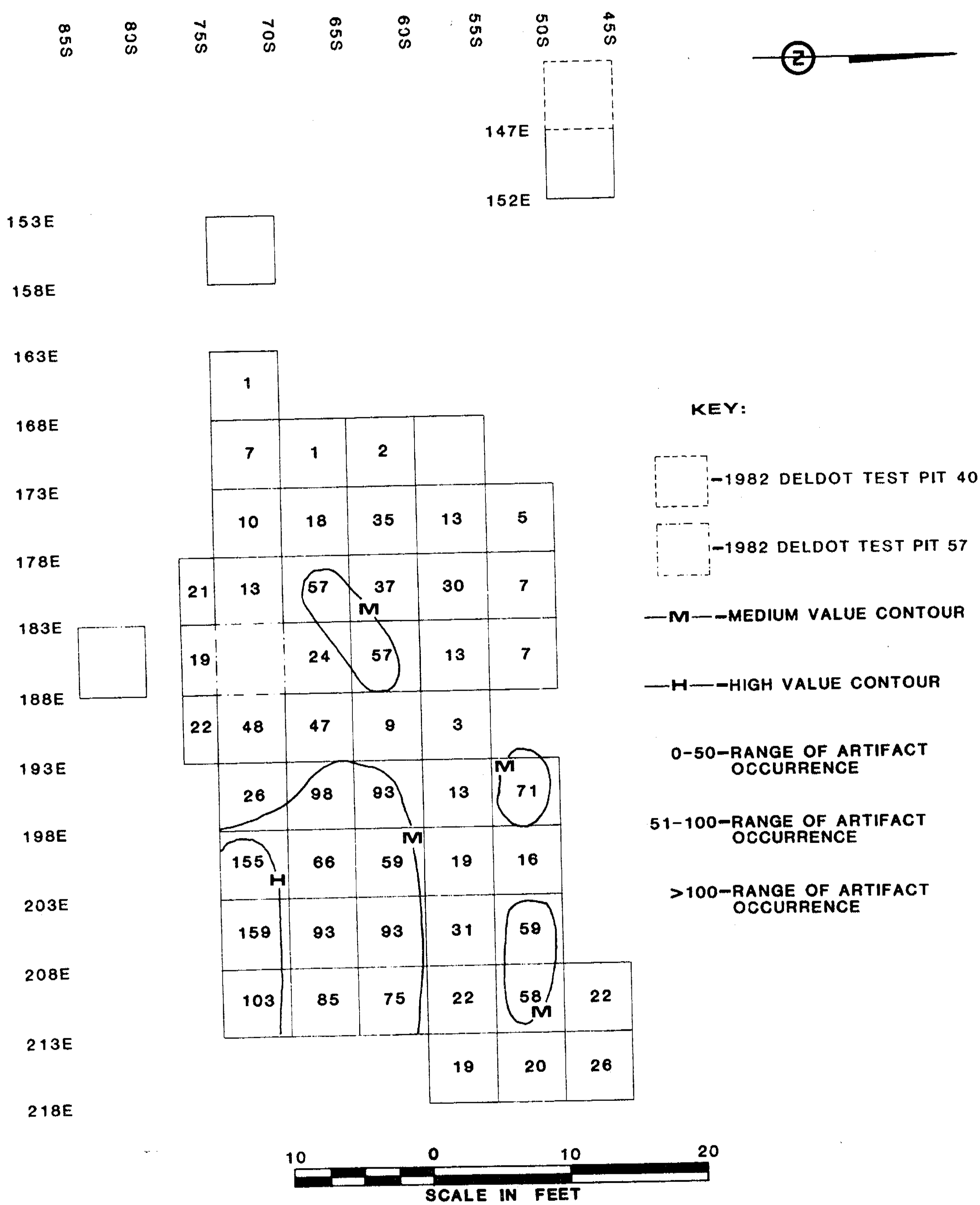


FIGURE 31

DISTRIBUTION OF IRONSTONE DEBITAGE

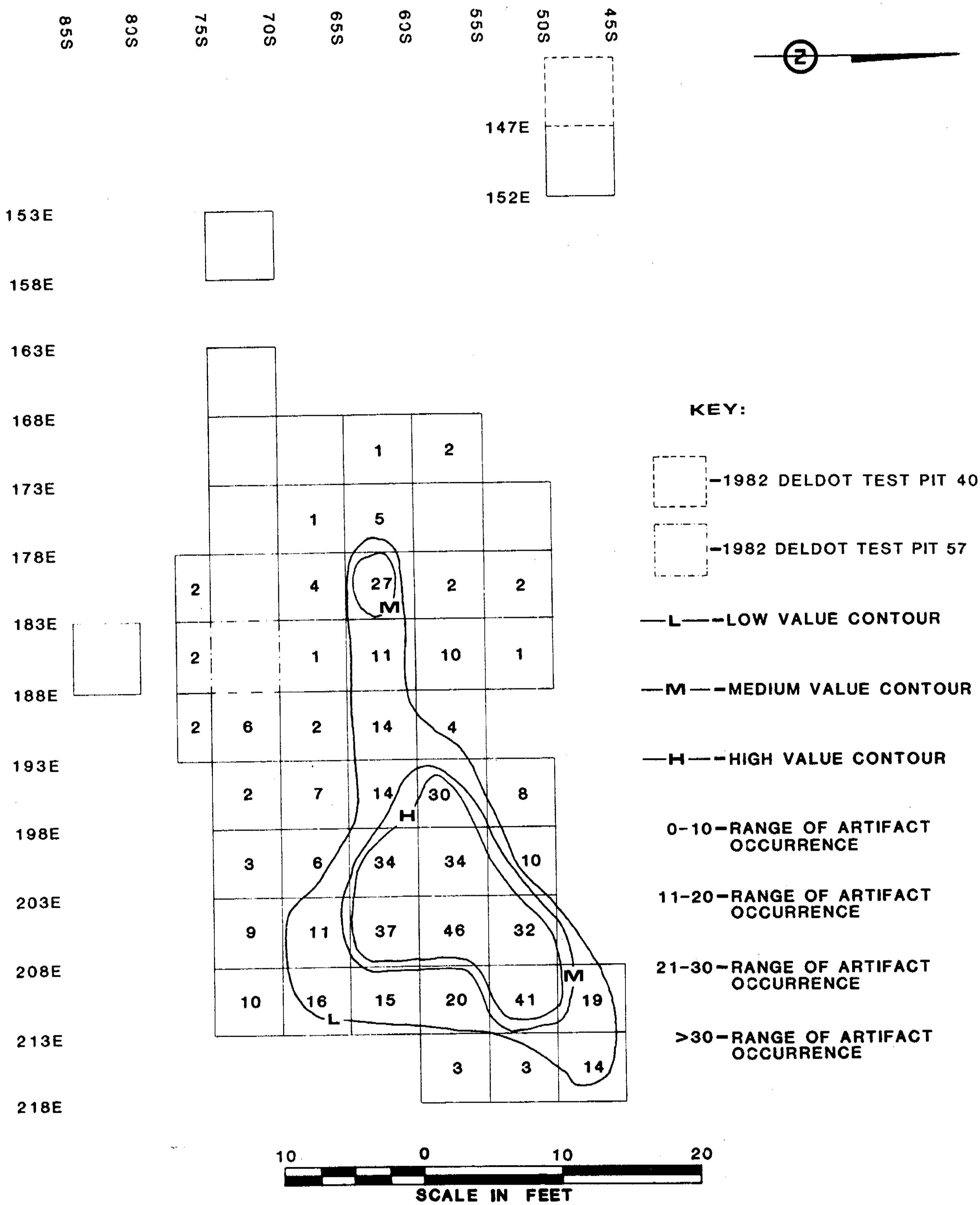


FIGURE 32

DISTRIBUTION OF RHYOLITE DEBITAGE

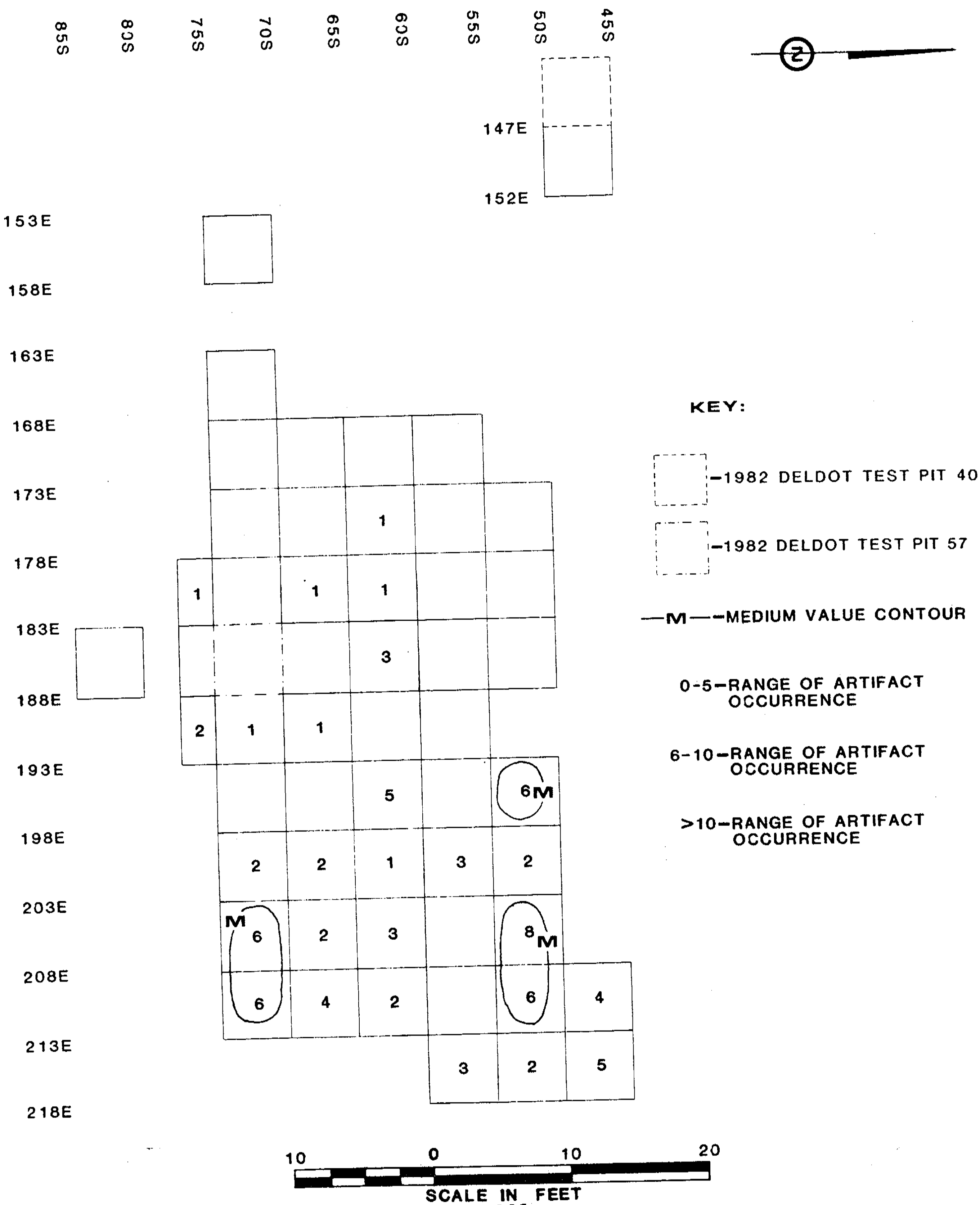


FIGURE 33

DISTRIBUTION OF ARGILLITE DEBITAGE

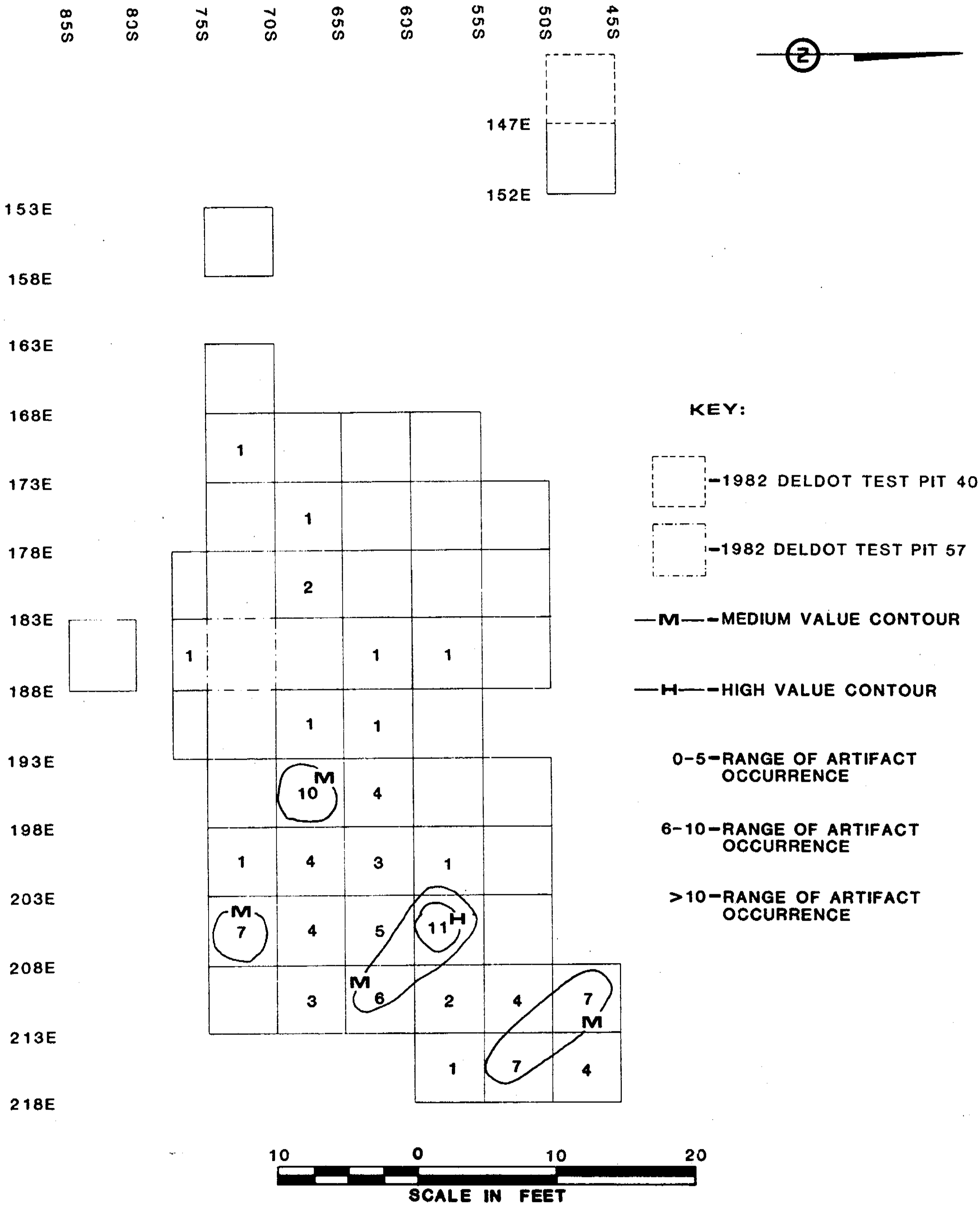


FIGURE 34

DISTRIBUTION OF DEBITAGE WITH CORTEX

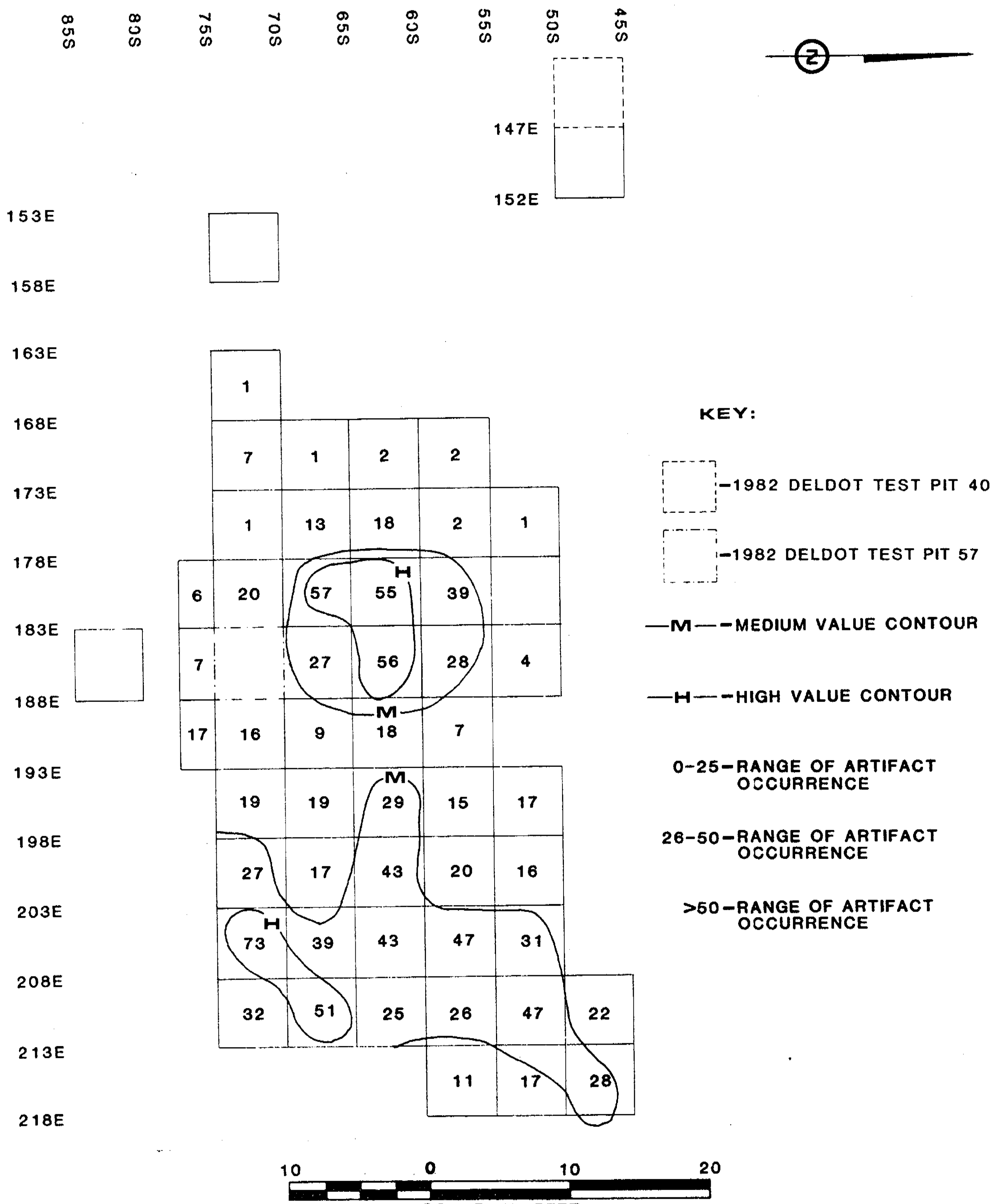
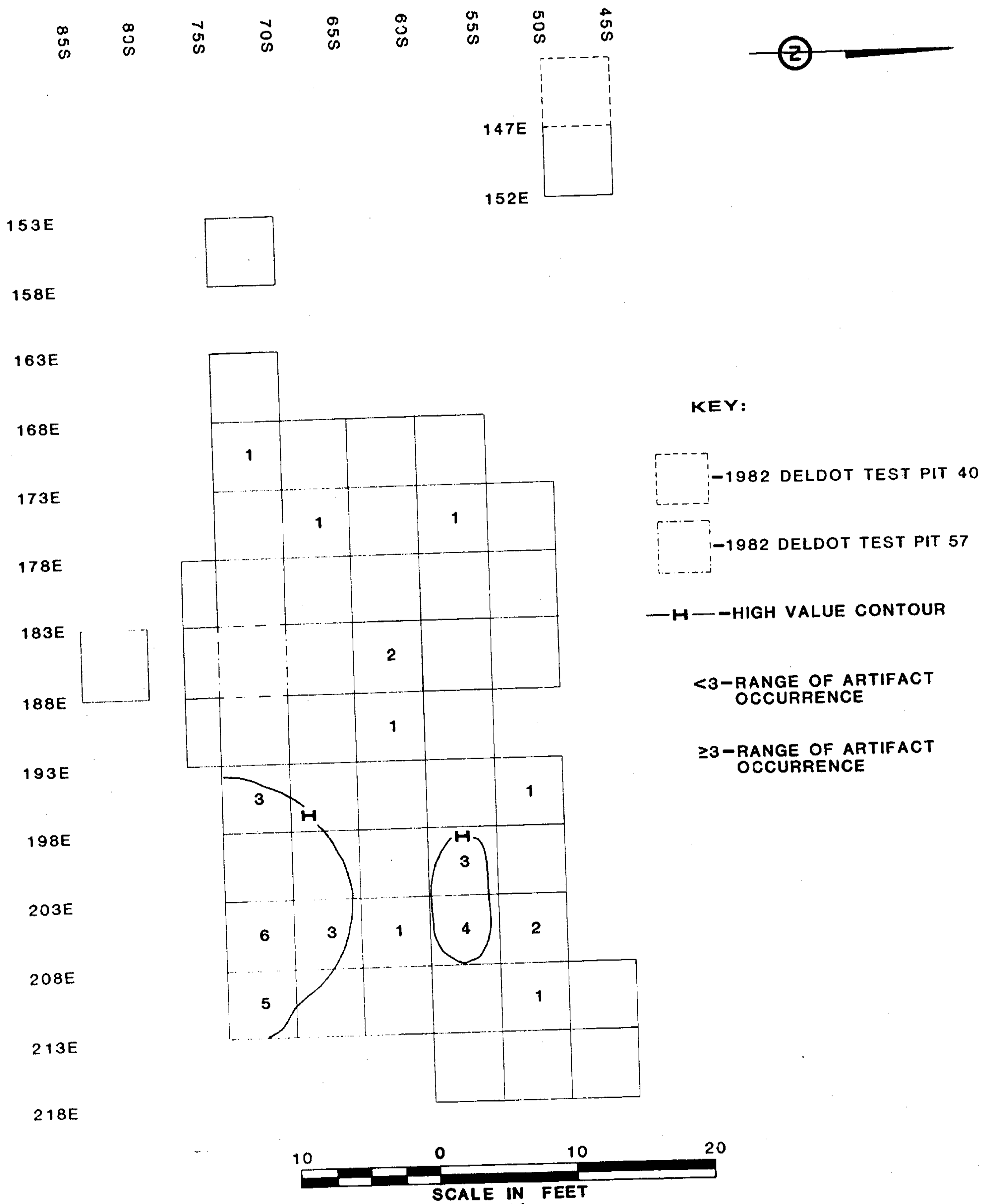


FIGURE 35

DISTRIBUTION OF CORES



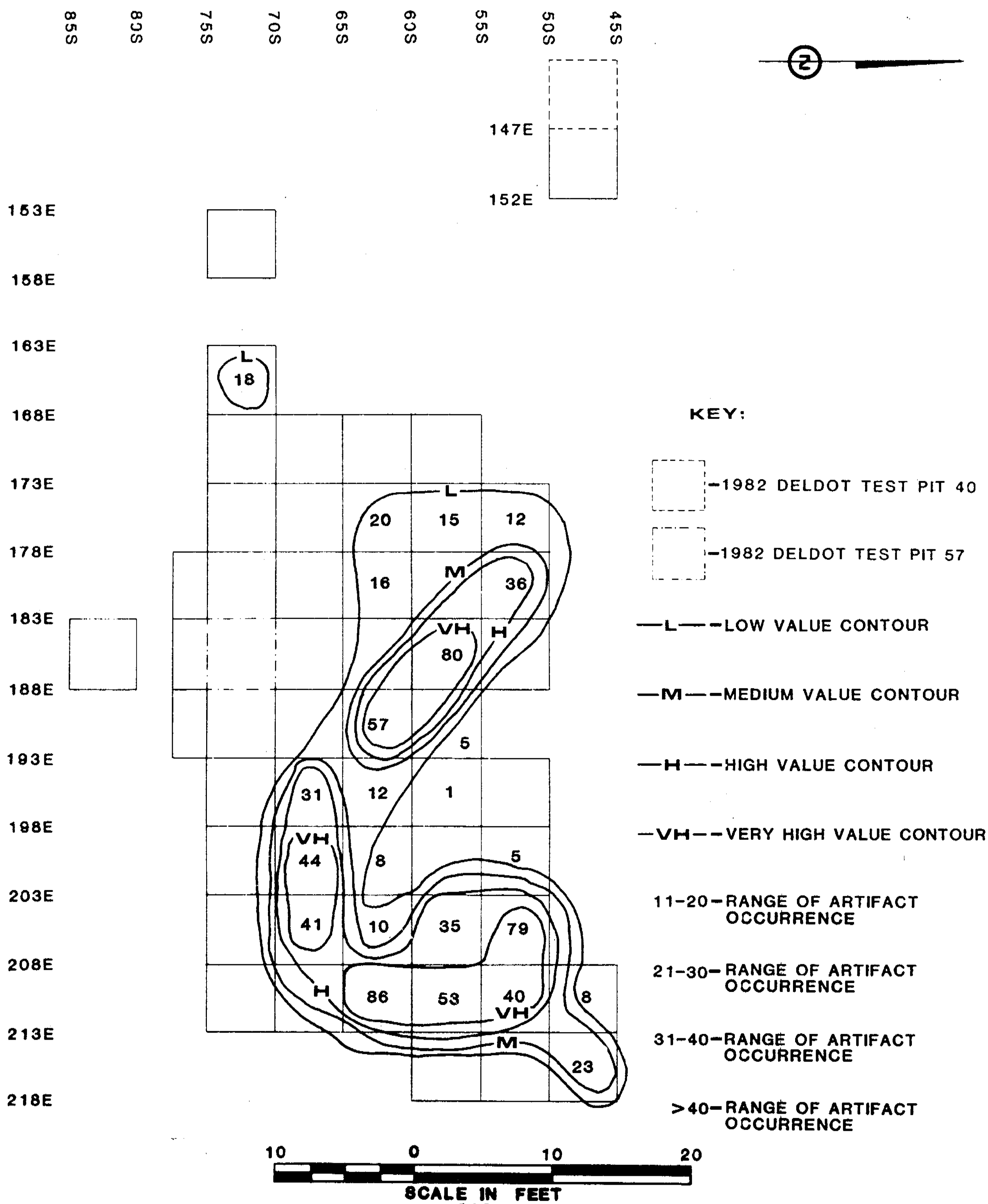
food processing. Whether or not these flakes were used directly in plant processing cannot be determined without high power magnificiation; however, given ethnographic analogies for seed and nut processing (Yellen 1977; Lee and DeVore 1976; Steward 1938; Kroeber 1925), it is unlikely that the flakes played a role in this activity. More likely, the flakes were produced for use as tools in other areas of the site. It can also be noted that concentrations of debitage with cortex and cryptocrystalline debitage coincide with Area III (Figure 34) suggesting that flake production also took place adjacent to the habitation area.

Distributions of non-local raw material debitage, such as ironstone, rhyolite, and argillite (Figures 31-33) are interesting because these materials were brought into the site as prepared tools, or cores, and were then reduced or resharpened to produce debitage. Flakes of all three materials were found in the vicinity of Area II supporting the earlier contention that prepared tools were resharpened and reduced in this area. A second concentration of ironstone is located adjacent to Area III indicating some tool refurbishing which was also indicated by other data.

A final class of artifacts whose distribution can be studied is debitage recovered from the flotation (Figure 36). These small flakes, indicative of resharpening and edge maintenance, are found in all three activity areas.

FIGURE 36

DISTRIBUTION OF FLOATATION DEBITAGE



In sum, three distinct activity areas can be noted at the Hawthorn site:

Area I - a seed/nut processing area with some cryptocrystalline flake production and hearths;

Area II - a butchering area with tools utilized and immediately discarded;

Area III - a habitation area associated with some resharpening, retooling, and discarding of tools.

Figure 37 shows the three areas and Table 14 summarizes their attributes.

Table 14

Activity Area Attributes

Area 1	Area II
-nut/seed remains	-slicing and cutting tools (butchering)
-hearths	-bone/wood working
-cryptocrystalline flake production	-impact fractured points from game carcass
-processing tools and features	-tools discarded during use
-resharpening debitage	-limited manufacturing of replacements
Area III	
-habitation area (house structure)	-non-local debitage
-"retooling" discards	-resharpening debitage
-flake production for cores	
-ironstone debitage	
-resharpening debitage	

CONCLUSIONS

This concluding section of the Hawthorn site (7NC-E-46) report will summarize the findings of the excavations, consider the role of the site in the regional settlement pattern, and note